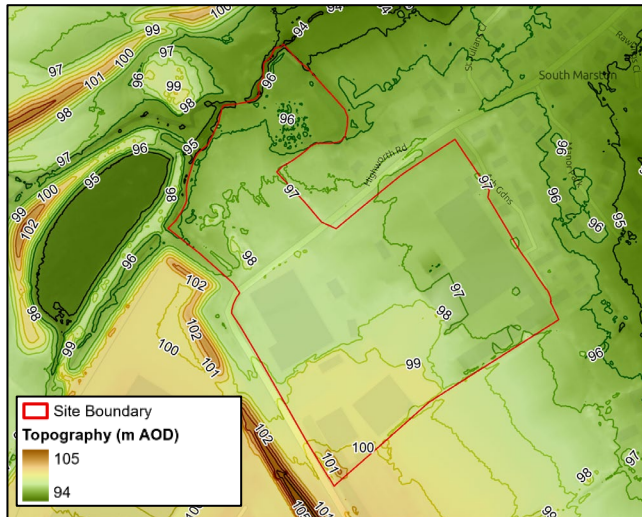
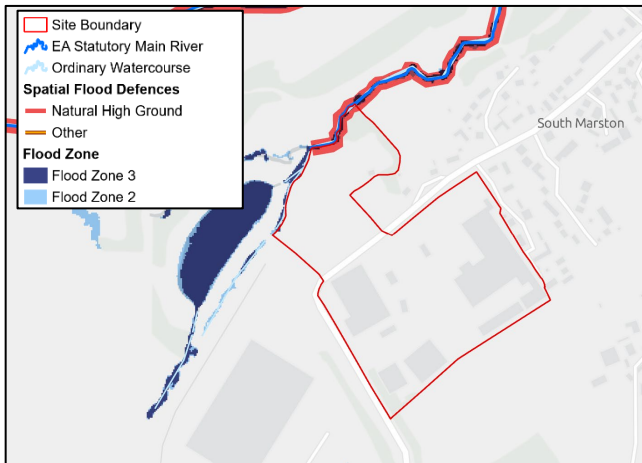
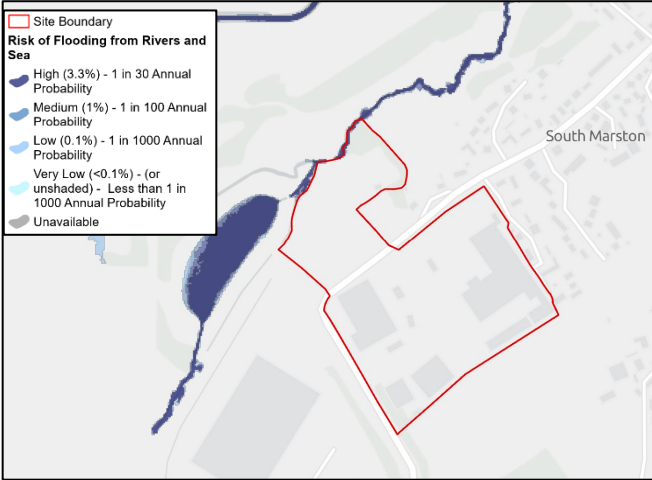
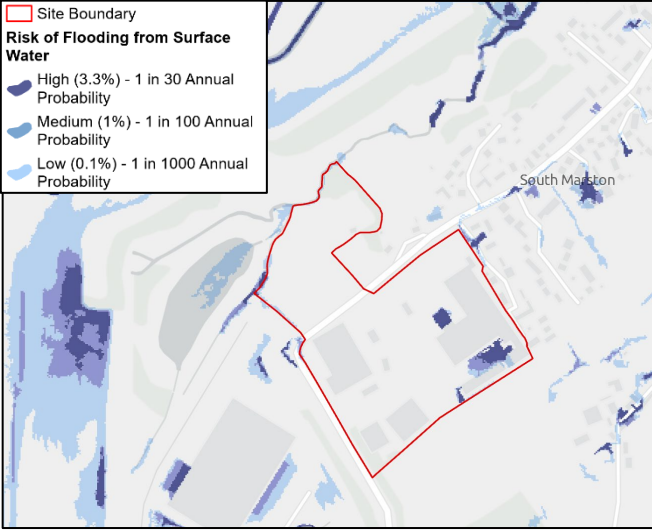


18-011- Thornhill Industrial Estate and Crown Timber (SHLAA ref: s0111 and s0112, Local Plan ref: NEV01)					
Grid Reference	SU 18885 87516		Post Code (nearest)	SN3 4TA	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site is located at Thornhill Industrial Estate. The South Marston Brook (EA Main River), borders the north of the site and flows in a north-easterly direction. The Brook flows through a small lake located approximately 30m to the north east of the site. The Kingsdown Brook is an EA Main River, located approximately 170m north of the site. It flows in an easterly direction, before discharging into the South Marston Brook approximately 350m downstream of the site.				
Topography				Ground levels fall from the southern corner, north and east, and range from 101m AOD to 96m AOD.	
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)				Almost all the site is in Flood Zone 1 'Low Probability'. A minor area along the northern site boundary is in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'.	
Flood Zone 1	99.6%	Flood Zone 2	0.3%	Flood Zone 3	0.1%
Flood Defences	There are no formal flood defences in the area, however the site benefits from natural high ground.				

Risk of Flooding from Rivers and Sea (RoFRS)		Almost all site is at 'Very low' risk. A minor area along the northern site boundary is at a 'Low' to 'High' risk of flooding. In the absence of equivalent modelled outputs, the RoFRS 1 in 30 annual probability (AP) extent indicates that a minor area along the northern boundary of the site is in Flood Zone 3b 'Functional Floodplain'.
Modelled Flood Extents (Present Day) (Rivers)	There is no detailed modelling available at the site	
Risk of Flooding from Surface Water (Present Day)		The majority of the site is outside all surface water extents (i.e. 'Very Low' risk), except for localised areas of ponding in the south east of the site at 'Low' to 'High' risk and areas along the northern and western boundary at a 'Low to 'High' risk.
Groundwater	The southern half of the site is located in an area with limited potential for groundwater flooding to occur. North of Thornhill Road the site is primarily outside of any areas susceptible to groundwater flooding, however the northern boundary is bordered by an area with the potential for groundwater flooding to occur at the surface – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 'Thames Water DG5 Sewer Flooding Records'.	
Historic Flooding Records	The site has not been impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 017 'EA Historic Flood Map'.	

Flood Risk – Climate Change

Climate Change Allowances

The site lies within the 'Gloucestershire and Vale Management Catchment'.

The peak river flow allowances are detailed below:

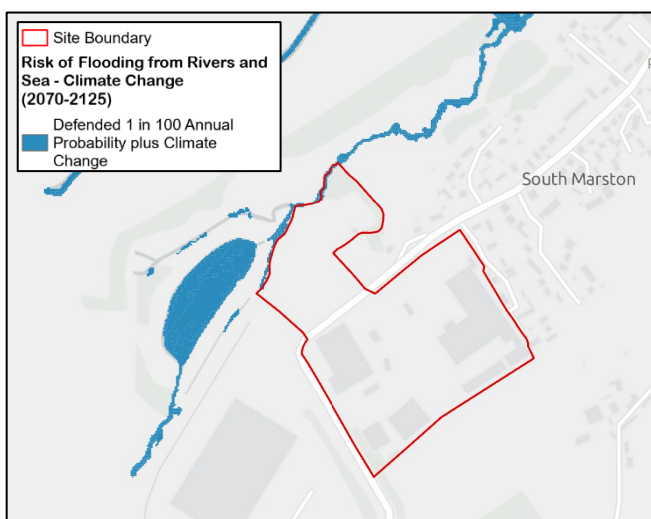
Management Catchment	Climate Change Allowance 2080's epoch		
	Central	Higher	Upper
<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%

The peak rainfall allowances are detailed below:

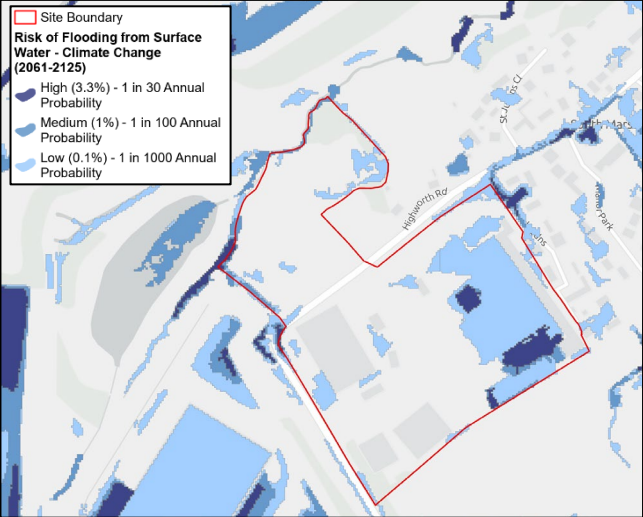
<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)	
	Central	Upper End
3.3% (1 in 30-year) rainfall	+25%	+35%
1% (1 in 100-year) rainfall	+25%	+40%

Modelled Flood Extents

(Rivers)
(Climate Change)

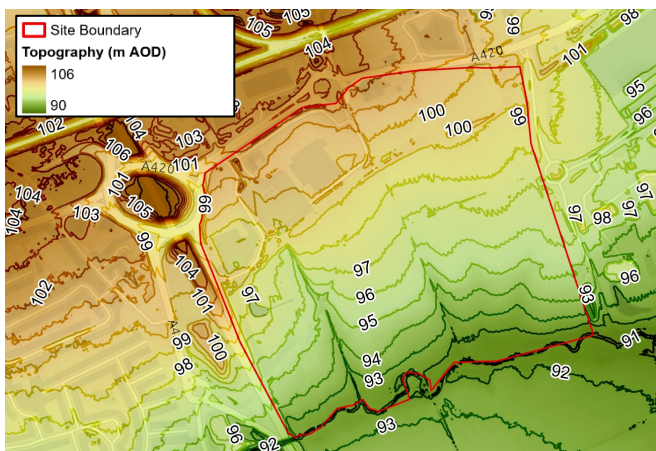
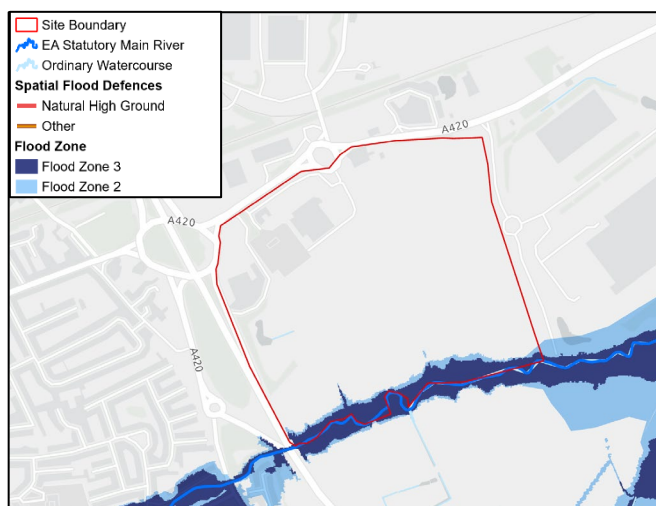


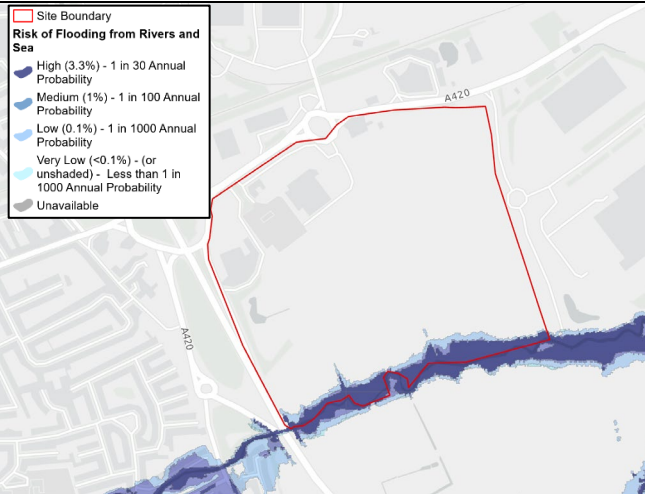
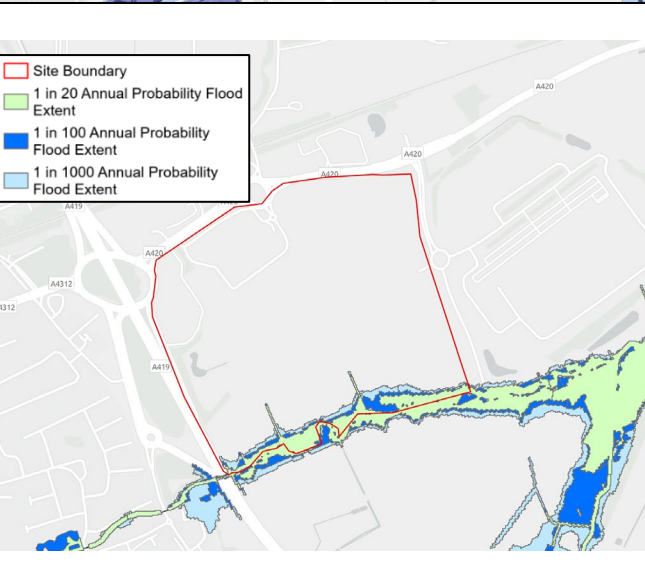
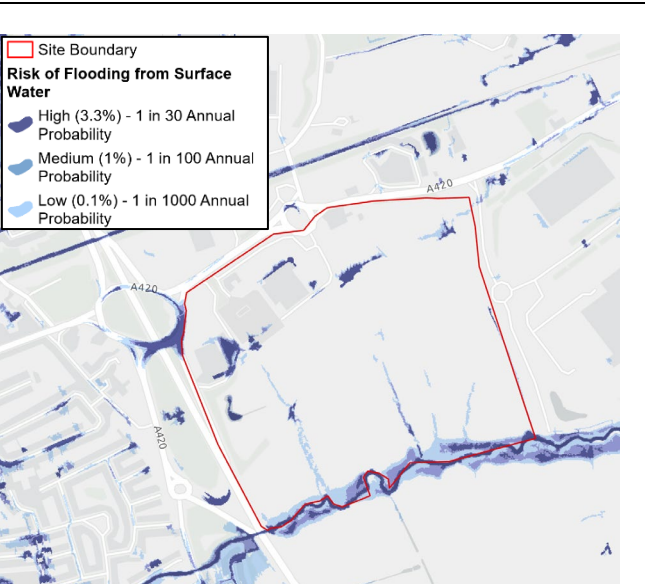
In the absence of modelled outputs, the RoFRS defended 1 in 100 plus climate change (CC) map shows that the flood extent remains similar to the present-day scenario, with minimal changes to flooding within the site.

Surface Water (incl Climate Change)		The majority of the western and northern areas of the site are outside all modelled extents (i.e. 'Very Low' risk), except for minor localised areas in the west of the site at 'Low' risk only. Flooding is largely concentrated in the eastern area, where there is a significant area at a 'Low' risk and a smaller areas at a 'Medium' to 'High' risk. Notably this is isolated ponding within the low lying parts of the site and not part of a wider overland flow route.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: Almost the entirety of the site is outside the 1 in 100 AP plus climate change fluvial flood extent, as is the access via Thornhill Road. Surface Water: The majority of the western areas of the site are outside the 1 in 100 AP plus climate change surface water flood extent, except for localised areas of ponding. The access via Thornhill Road is however impacted by surface water flooding and may require further consideration.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

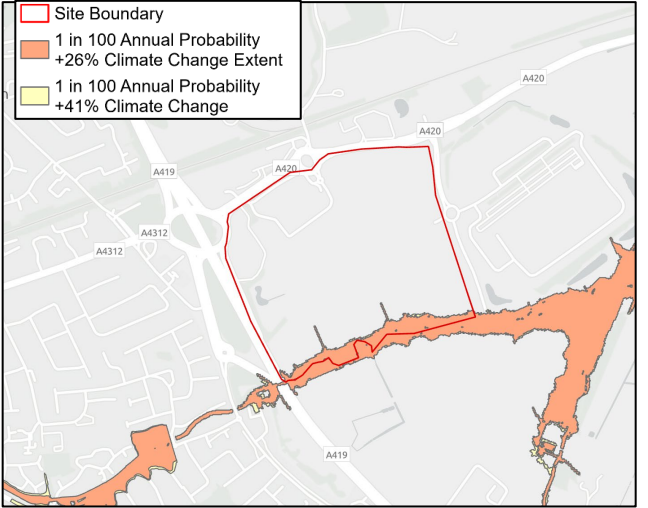
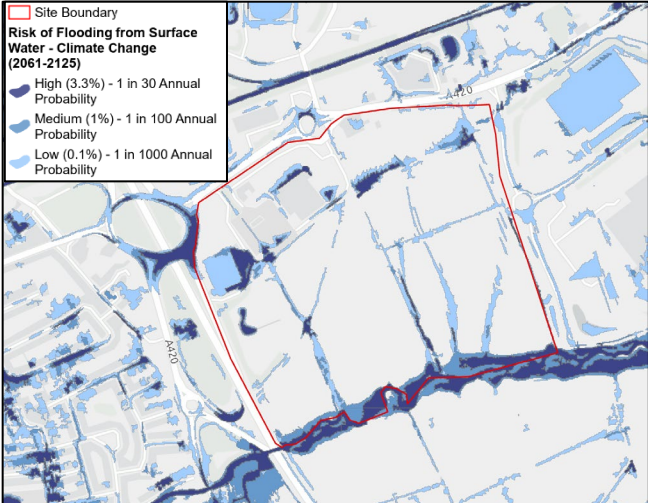
	Summary of Flood Risk A summary of the flood risk to the site is provided below: • Almost all of the site area is in Flood Zone 1 'Low Probability', with minor areas along the northern site boundary being encroached by Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'; • The RoFRS mapping indicates that almost all of the site is at 'Very Low' risk of flooding, with only a minor area along the northern boundary falling within Flood Zones 2 and 3. • There are no modelled flood extents for the site area; • The RoFSW mapping indicates that the majority of the site is at 'Very Low' risk of surface water flooding. During the surface water plus climate change events, there are more significant areas at a 'Low' to 'High' risk in the east of the site as well as smaller, localised areas throughout the rest of the site. There are also areas of flooding along the access routes to/from the site; • The site is not at risk of flooding in the event of a reservoir breach; • Some areas of the site are susceptible to groundwater flooding. • Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers. • There is no record of the site having been impacted by historic flood events. The majority of the site is at very low risk from all sources of flooding. Flood risk from fluvial sources is concentrated along the northern site boundary, whilst pluvial flooding is largely concentrated in the eastern areas of the site. During the climate change events there is more significant surface water flooding in the east of the site, particularly in extreme events, with smaller, localised areas of surface water flooding located throughout rest of the site. As flooding is largely constrained to the northern and eastern areas of the site it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) Development is appropriate in Flood Zone 1, over the majority of the site. Development in Flood Zone 2 is appropriate, subject to the Sequential Test Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	<u>Spatial Planning</u> Almost the entirety of the site is in Flood Zone 1 'Low Probability'. A minor area of the site, along the northern border is located within Flood Zone 2 'Medium Probability' and areas of both Flood Zone 3a 'High Probability' and Flood Zone 3b 'Functional Floodplain' of the South Marston Brook. A review of flood risk within the site has been carried out, and as the only significant risk of flooding is from surface water ponding (which could be managed through a SuDS drainage strategy,, and largely concentrated in the eastern area of the site, it is considered feasible to design the development, such that it remains safe throughout the lifetime of the development. Isolated areas of surface water ponding are identified on Thornhill Road and may require further consideration in terms of safe access.

	It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26% allowance for climate change. In the absence of detailed modelling the outline of the extreme 1 in 1000 AP floodplain could be defined and used as a proxy, with an additional 300mm allowance included in recommendations to allow for the uncertainty. The development should be set a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; 2. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event; 3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 4. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA; 5. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';

18-013b- Great Stall West (SHLAA ref: s0001, Local Plan v. ref:NEV02)					
Grid Reference	SU 19101 86233		Post Code (nearest)	SN3 4EW	
Development Proposal	Residential- led, offices and industrial		Vulnerability Classification	'More Vulnerable' (at worst)	
Site Description	The existing site primarily comprises farmland, with shopping facilities and parking located in the north west of the site. The River Cole (EA Main River), borders the southern site boudary and flows in a western direction. There is a very small watercourse connected to a pond, located in the west of the site. There are also two small field drains located within the site, draining to the River Cole.				
Topography			Ground levels fall from north to south and range from 103m AOD to 91m AOD.		
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)			The majority of the site is in Flood Zone 1 'Low Probability'. A narrow corridor of land along the southern site boundary is located in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'.		
Flood Zone 1	93.2%	Flood Zone 2	1.5%	Flood Zone 3	5.3%
Flood Defences	There are no formal flood defences in the area.				

Risk of Flooding from Rivers and Sea (RoFRS)		The majority of the site is at a 'Very low' risk. A narrow area along the southern site boundary is at a 'Low' to 'High' risk of flooding.
Modelled Flood Extents (Present Day) (Rivers)		The majority of the site is outside all modelled extents. The southern area is located within the modelled 1 in 20 AP flood extent, the 1 in 100 AP flood extent and the 1 in 1000 AP flood extent.
Risk of Flooding from Surface Water (Present Day)		The majority of the site is outside all surface water extents (i.e. 'Very Low' risk). Flooding is largely concentrated in the southern area along the river floodplain, where there are areas ranging from 'Low' to 'High' risk. There are areas of isolated surface water ponding, as well as surface water flow routes within the site along the field drains.
Groundwater	The majority of the site is outside of any areas susceptible to groundwater flooding, however a very small area along the southern boundary and an area in the centre of the site along a small field drain is identified as having potential for groundwater flooding to occur at the surface – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	

Reservoirs and other sources	A small area in the south of the site, along the River Cole corridor, is at risk of reservoir flooding when river levels are normal and when there is also flooding from rivers - see Level 1 SFRA – Figure 011 ‘Risk of Flooding from Reservoirs – Maximum Flood Extent’. It should be emphasised that the risk of flooding from a reservoir breach is very small. The EA is the enforcement authority for the Reservoirs Act (1975) and there is a mandatory requirement for all large, raised reservoirs to be inspected and supervised by reservoir panel engineers. Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 ‘Thames Water DG5 Sewer Flooding Records’.														
Historic Flooding Records	A small area in the south of the site has been impacted by historic flood events – see Level 1 SFRA – Figure 017 ‘EA Historic Flood Map’.														
Flood Risk – Climate Change															
Climate Change Allowances	The site lies within the ‘Gloucestershire and Vale Management Catchment’. The peak river flow allowances are detailed below: <table><tr><th rowspan="2">Management Catchment</th><th colspan="3">Climate Change Allowance 2080’s epoch</th></tr><tr><th>Central</th><th>Higher</th><th>Upper</th></tr><tr><td><i>Gloucestershire and Vale Management Catchment</i></td><td>+26%</td><td>+41%</td><td>+84%</td></tr></table>	Management Catchment	Climate Change Allowance 2080’s epoch			Central	Higher	Upper	<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%			
	Management Catchment		Climate Change Allowance 2080’s epoch												
		Central	Higher	Upper											
	<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%											
	The peak rainfall allowances are detailed below: <table><tr><th rowspan="2"><i>Gloucestershire and the Vale Management Catchment</i></th><th colspan="2">Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)</th></tr><tr><th><i>Central</i></th><th><i>Upper End</i></th></tr><tr><td>3.3% (1 in 30-year) rainfall</td><td>+25%</td><td>+35%</td></tr><tr><td>1% (1 in 100-year) rainfall</td><td>+25%</td><td>+40%</td></tr></table>				<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)		<i>Central</i>	<i>Upper End</i>	3.3% (1 in 30-year) rainfall	+25%	+35%	1% (1 in 100-year) rainfall	+25%	+40%
	<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)													
<i>Central</i>		<i>Upper End</i>													
3.3% (1 in 30-year) rainfall	+25%	+35%													
1% (1 in 100-year) rainfall	+25%	+40%													

Modelled Flood Extents (Rivers) (Climate Change)		The majority of the site is outside all modelled extents. A small area along the southern boundary is located in the 1 in 100 AP +26% (and +41%) climate change flood extent.
Surface Water (incl Climate Change)		The majority of the site is outside all modelled extents (i.e. 'Very Low' risk), however there are areas ranging from 'Low' to 'High' risk scattered throughout the site. Flooding is largely concentrated in the southern area, ranging from 'Low' to 'High'. There are surface water flow routes within the site – and serving an internal site drainage function - and areas of surface water ponding.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The majority of the site is outside the 1 in 100 AP plus climate change fluvial flood extent, as is the adjacent access via Oxford Road and Gable Cross. Surface Water: The majority of the site is outside the 1 in 100 AP plus climate change surface water flood extent, however there are surface water flow routes and areas of ponding within the site. The adjacent access via Oxford Road and Gable Cross is impacted by surface water flooding and may require further consideration.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow		

groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA.

The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.

Summary of Flood Risk

A summary of the flood risk to the site is provided below:

- Almost all of the site area is in Flood Zone 1 'Low Probability', with small areas along the northern site boundary being encroached by Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability';
- The southern area of the site lies within the 1 in 20 AP flood extent, and therefore is located within the 'Functional Floodplain';
- The southern area of the site is located in the 'design' 1 in 100 AP +26% climate change extent;
- The surface water flood risk is concentrated in the south of the site, however there are surface water flow routes and areas of ponding throughout the site. There is also surface water flood risk on the wider access routes to/from the site.
- An area in the south of the site is at risk of flooding in the event of a reservoir breach, when river levels are normal and when there is also flooding from rivers;
- The majority of the site is not located in an area susceptible to groundwater flooding, however some small areas along the southern boundary and in the centre of the site have potential for groundwater flooding to occur at the surface.
- Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers.
- A small area in the south of the site has been impacted by historic flood events.

The majority of the site is at a very low risk of flooding. Flood risk from fluvial sources are concentrated in the southern part of the site. Pluvial flooding is the main source of flooding to the site and is largely concentrated in the south of the site, however there are surface water flow routes running through the site and areas of ponding, therefore mitigation may be required to develop the site safely and in accordance with the requirements of the NPPF.

It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.

Implications for New Development

Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development)

Development is appropriate in Flood Zone 1, over the majority of the site.

Development in Flood Zone 2 is appropriate, subject to the Sequential Test

Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test

Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.

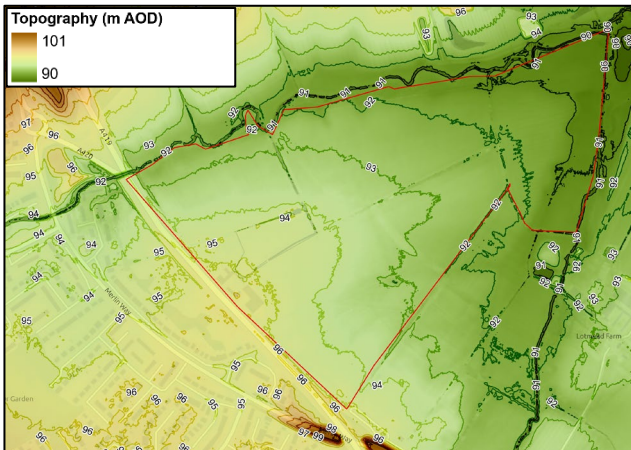
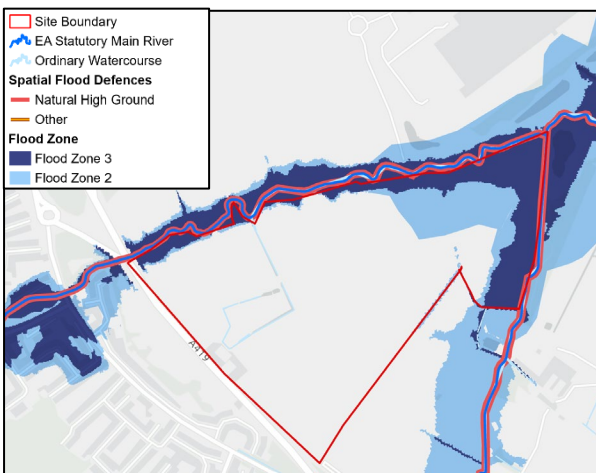
Planning Recommendations

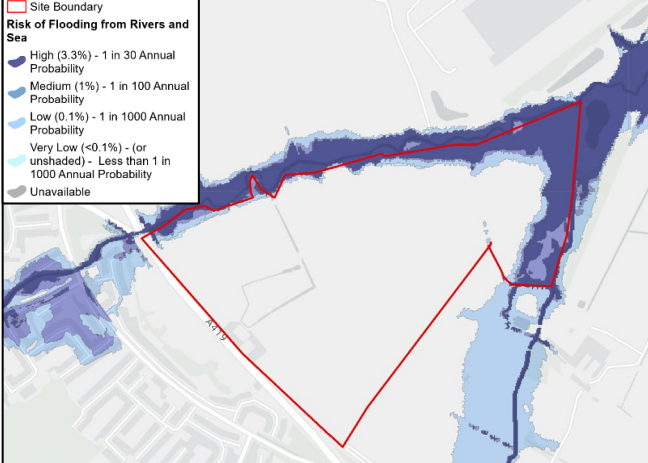
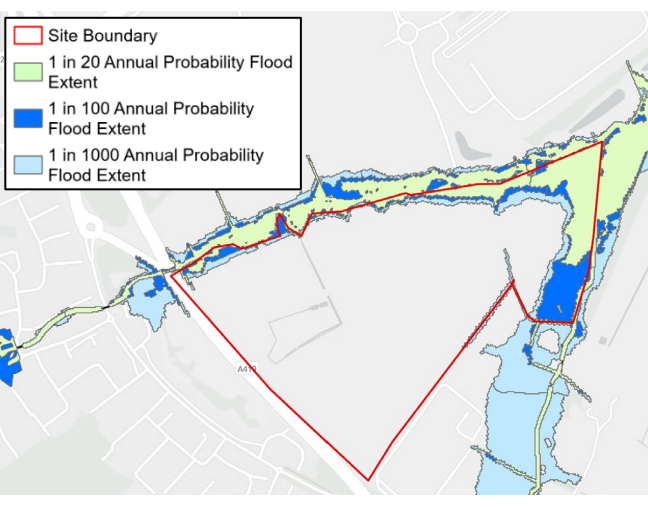
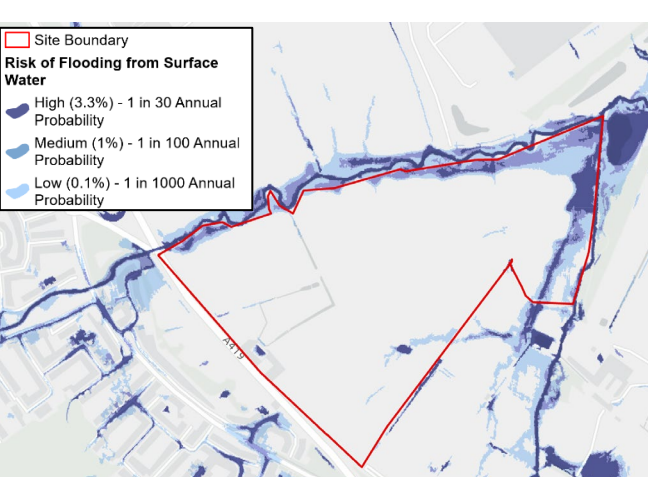
Spatial Planning

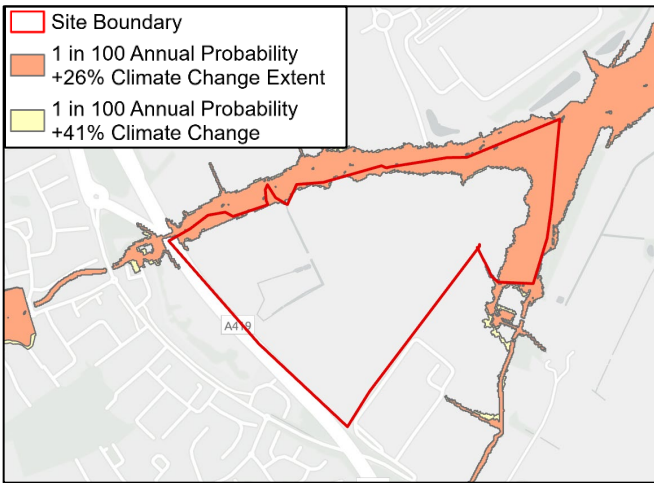
The majority of the site is in Flood Zone 1 'Low Probability'. A small area along the southern site boundary is within Flood Zone 2 'Medium Probability' and both Flood Zone 3a 'High Probability' and Flood Zone 3b 'Functional Floodplain' of the River Cole.

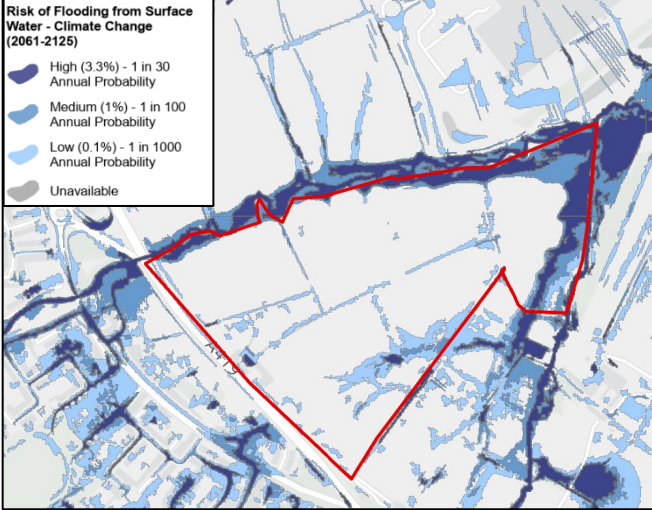
A review of flood risk within the site has been carried out, indicating that the main source of flood risk to the site is from surface water and therefore mitigation measures may need to be implemented to ensure that the development remains safe throughout its lifetime. The adjacent access via Oxford Road and Gable Cross is impacted by surface water flooding and may require further consideration.

	It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26%, allowance for climate change, and a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; 2. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event; 3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 4. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA; 5. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';

18-014- Upper Lotmead (SHLAA ref: s0440, Local Plan ref: NEV03)					
Grid Reference	SU 19403 85790		Post Code (nearest)	SN4 0SN	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises fields and Nythe Farm. The River Cole (EA Main River), borders the northern site bounday and flows in an eastern direction. The Dorcan Stream (EA Main River) borders the eastern site boundary and flows in a northerly direction before discharging into the River Cole at the north-eastern corner of the site. There is an ordinary watercourse located within the site that rises from a small pond in the site and discharges into the River Cole at the northern site boundary. There is another small ordinary watercourse locate at the south-eastern site boundary.				
Topography				Ground levels fall from west to east and range from 96m AOD to 90m AOD.	
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)				The central and western area of the site is in Flood Zone 1 'Low Probability'. Land along the northern site boundary and the eastern area of the site is in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'.	
Flood Zone 1	75.40%	Flood Zone 2	9.95%	Flood Zone 3	14.60%
Flood Defences	There are no formal flood defences in the area, however the site benefits from natural high ground.				

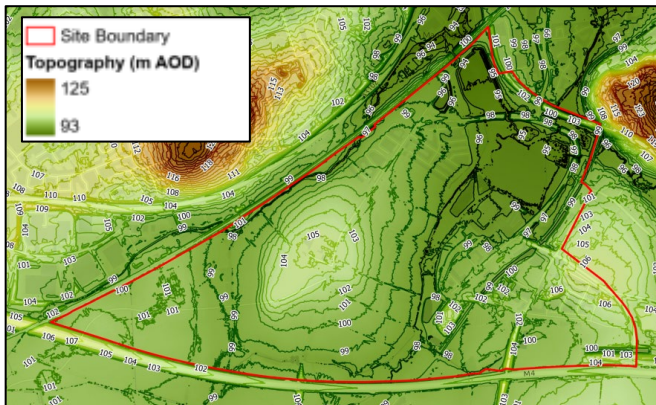
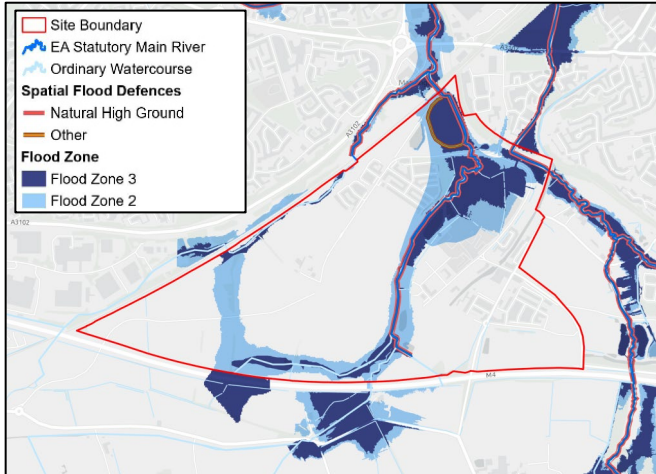
Risk of Flooding from Rivers and Sea (RoFRS)		The central and western areas are at 'Very low' risk. An area along the northern site boundary and the eastern area of the site is at 'High' risk of flooding.
Modelled Flood Extents (Present Day) (Rivers)		The central and western areas of the site are outside all modelled extents. An area along the northern site boundary and the eastern area of the site is located within the 1 in 20 AP flood extent, the 1 in 100 AP flood extent and the 1 in 1000 AP flood extent.
Risk of Flooding from Surface Water (Present Day)		The majority of the central and western areas are outside all surface water extents (i.e. 'Very Low' risk), except for small areas at 'Low' to 'High' risk. Flooding is largely concentrated along the northern site boundary and in the eastern area of the site, where there are more significant areas ranging from 'Low' to 'High'.
Groundwater	The majority of the site is outside of any areas susceptible to groundwater flooding, however areas along the northern and eastern boundary have potential for groundwater flooding to occur at the surface – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other sources	The northern and eastern areas of the site are at risk of flooding when river levels are normal and when there is also flooding from rivers - see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. It should be emphasised that the risk of flooding from a reservoir breach is very small. The EA is the enforcement authority for the Reservoirs Act (1975) and there is a mandatory requirement for all large, raised reservoirs to be inspected and supervised by reservoir panel engineers.	

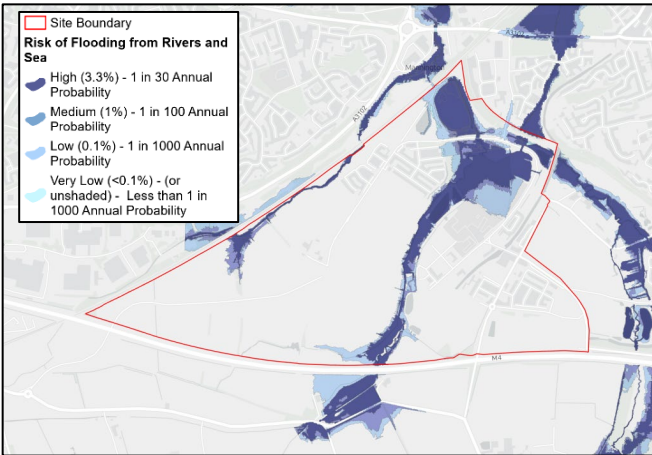
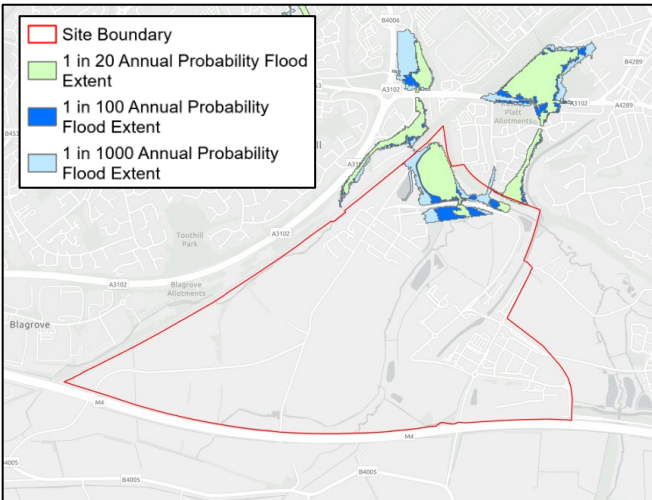
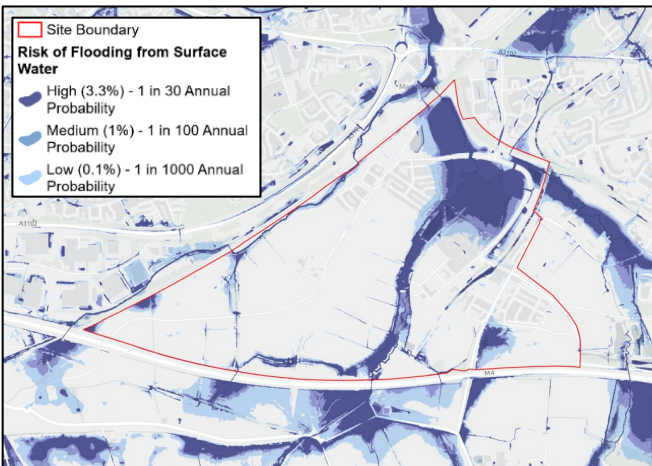
	Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 ‘Thames Water DG5 Sewer Flooding Records’.			
Historic Flooding Records	The eastern areas of the site have been impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 017 ‘EA Historic Flood Map’.			
Flood Risk – Climate Change				
Climate Change Allowances	The site lies within the ‘Gloucestershire and Vale Management Catchment’.			
	The peak river flow allowances are detailed below:			
	Management Catchment	Climate Change Allowance 2080’s epoch		
		Central	Higher	Upper
	Gloucestershire and Vale Management Catchment	+26%	+41%	+84%
Climate Change Allowances	The peak rainfall allowances are detailed below:			
	Gloucestershire and the Vale Management Catchment	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)		
		Central	Upper End	
	3.3% (1 in 30-year) rainfall	+25%	+35%	
	1% (1 in 100-year) rainfall	+25%	+40%	
Modelled Flood Extents (Rivers) (Climate Change)	Site Boundary 1 in 100 Annual Probability +26% Climate Change Extent 1 in 100 Annual Probability +41% Climate Change 		The central and western areas are outside all modelled extents. The northern and eastern areas are located in the 1 in 100 AP +26% (and +41%) climate change flood extent.	

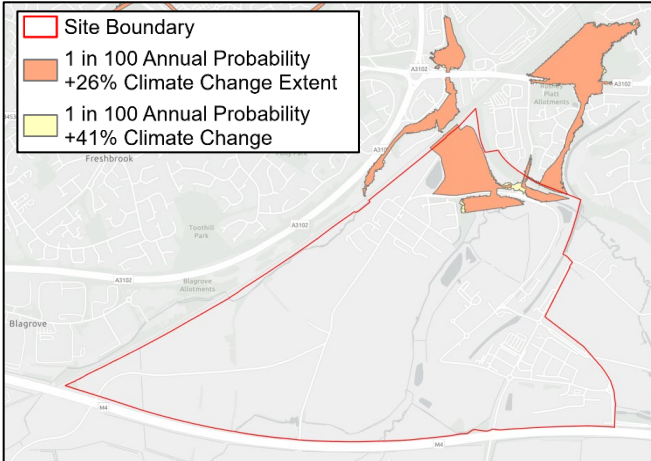
Surface Water (incl Climate Change)		T The majority of the central and western areas of the site are outside all modelled extents (i.e. 'Very Low' risk), however there are some flow routes and areas of surface water ponding within the site, which appear to correlate with land drainage ditches. Flooding is largely concentrated along the northern boundary and in the eastern areas of the site, where there are more significant areas ranging from 'Low' to 'High'.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The majority of the site is outside the 1 in 100 AP plus climate change fluvial flood extent, as is the adjacent access via the A419 Road. Surface Water: The majority of the central areas of the site are outside the 1 in 100 AP plus climate change surface water flood extent. Surface water is largely concentrated in the northern and eastern areas of the site. The A419 road immediately adjacent to the site remains dry during a surface water flood event, however the wider access routes from the site is impacted by surface water flooding and may require further consideration.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

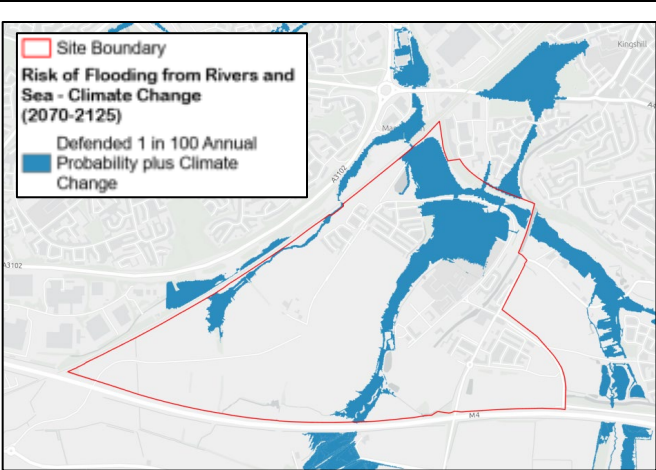
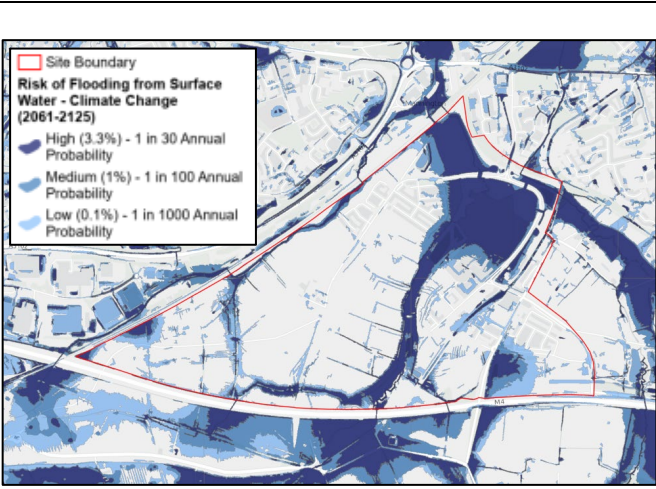
	Summary of Flood Risk A summary of the flood risk to the site is provided below: • The central and western areas of the site are in Flood Zone 1 'Low Probability', whereas the northern and eastern areas of the site are located in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'; • The northern and eastern areas of the site alongside the respective watercourses lie within the 1 in 20 AP flood extent, and are therefore located within the 'Functional Floodplain' • The northern and eastern areas of the site are impacted in the 'design' 1 in 100 AP +26% climate change extent; • The RoFSW mapping indicates surface water flood risk is concentrated in the northern and eastern areas of the site. The majority of the western area of the site is not at risk of surface water flooding, however there are some areas of surface water ponding and flow routes, during the climate change events associated with local drainage channels. There is also surface water flood risk on the wider access routes to/from the site; • The northern and eastern areas of the site are at risk of flooding when river levels are normal and when there is also flooding from rivers; • The majority of the site is not located in an area susceptible to groundwater flooding, however areas along the northern and eastern boundary have potential for groundwater flooding to occur at the surface. • Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers. • The eastern areas of the site have been impacted by historic flood events. The majority of the central and western areas of the site are at a low risk of flooding from all sources. Flood risk from fluvial sources are concentrated in the northern and eastern areas of the site. Pluvial flooding is the main source of flooding to the site and is concentrated in the northern and eastern areas of the site. There are surface water flow routes and areas of ponding located in the western areas of the site, particularly during the climate change events. Therefore mitigation may be required to develop the site safely and in accordance with the requirements of the NPPF. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) Development is appropriate in Flood Zone 1, over the central and western part of the site. Development in Flood Zone 2 is appropriate, subject to the Sequential Test Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	<u>Spatial Planning</u> The western and central areas of the site are in Flood Zone 1 'Low Probability'. A small area along the northern site boundary as well as the eastern area of the site is within Flood Zone 2 'Medium Probability' and areas of both Flood Zone 3a 'High Probability' and Flood Zone 3b 'Functional Floodplain' of the River Cole and Dorcan Stream. A review of flood risk within the site has been carried out, and flood risk is largely concentrated along the northern site boundary and in the eastern area of the site. However, the surface water plus climate change extent shows surface water flow routes and areas of ponding in the western areas of the site. The A419 immediately adjacent to the site is dry during the surface water 1 in 100 AP

	event plus climate change, however the wider access route is impacted and may require further consideration. It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26%, allowance for climate change, and a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; 2. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event; 3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 4. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA; 5. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';

18-018- Wichelstowe (SHLAA ref: UCS.0464)					
Grid Reference	SU 12853 82865		Post Code (nearest)	SN1 7FL	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site mostly comprises grassland, with some residential areas located in the northern and eastern section of the site and farm outbuildings located in the centre of the site. Areas over the western part of the site are subject to new and ongoing development. The site is bordered by a railway track immediately to the north and west, the M4 motorway to the immediate south and a mix of grassland and residential properties to the east. There are multiple access routes available into the site (Mill Lane, Redposts Drive, Blackhorse Way or Wichel Way). The Wichelstowe and Berkshire Canal lies in the eastern part of the site. The Elcombe Brook (EA Main River) flows north directly through the centre of the site. The River Ray (another EA Main River) crosses the north-eastern corner of the site boundary. The Brook forms a confluence with the River Ray approximately 1km north of the site. An ordinary watercourse tributary of the River Ray flows north-east along the north-western boundary of the site, partially flowing into the site area				
Topography				Ground levels at the site generally fall from high points on the eastern boundary and in the centre of the site. Topography at the site ranges from 94m AOD to 106m AOD.	
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)				Significant areas in the central area, western and eastern areas of the site area lie in Flood Zone 1 'Low Probability'. Land in the northern area of the site, and north-south through its centre of the site along the Elcombe Brook is in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'. Flood Zone 2 and 3 areas also border parts of the southern and north-western site boundary. An area of Flood Zone 2 bisects the western part of the site.	
Flood Zone 1	73.0%	Flood Zone 2	14.7%	Flood Zone 3	12.3%

Flood Defences	A flood storage area lies at the northern end of the site and provides storage capacity within a landscaped area to reduce peak flows downstream on the Elcombe Brook.	
Risk of Flooding from Rivers and Sea (RoFRS)		The majority of the site is located in the 'Very Low' risk area. The northern area of the site, and the corridor along the route of the Elcombe Brook through the centre of the site, are at 'High' risk of flooding. A narrow area of 'High' risk is also located along the route of the ordinary watercourse to the north-west
Modelled Flood Extents (Present Day) (Rivers)		No detailed modelling is available from the EA for the Elcombe Brook, and as such the majority of the site area is located outside all modelled extents. Areas in the northern area of the site are located within the 1 in 20 AP flood extent, 1 in 100 AP flood extent and the 1 in 1000 AP flood extent (this includes the flood alleviation area).
Risk of Flooding from Surface Water (Present Day)		Most of the site lies outside of the surface water extents and at 'Very Low' risk. The northern/ north-eastern area of the site, the corridor along the route of the Elcombe Brook through the centre of the site, and some smaller land drainage routes, are at 'High' risk of flooding. A narrow area of 'High' risk is also located along the route of the ordinary watercourse to the north-west of the site.
Groundwater	The western corner of the site falls within an area with ' <i>limited potential for groundwater flooding to occur</i> ', with most of the site located outside of any areas susceptible to groundwater flooding – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'.	

	Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 018 'Thames Water DG5 Sewer Flooding Records'.			
Historic Flooding Records	The are no records of the site being impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 016 'EA Historic Flood Map'.			
Flood Risk – Climate Change				
Climate Change Allowances	The site lies within the 'Gloucestershire and Vale Management Catchment'.			
	The peak river flow allowances are detailed below:			
	Management Catchment	Climate Change Allowance 2080's epoch		
		Central	Higher	Upper
	Gloucestershire and Vale Management Catchment	+26%	+41%	+84%
Climate Change Allowances	The peak rainfall allowances are detailed below:			
	Gloucestershire and the Vale Management Catchment	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)		
		Central	Upper End	
		3.3% (1 in 30-year) rainfall	+25%	+35%
	1% (1 in 100-year) rainfall	+25%	+40%	
Modelled Flood Extents (Rivers) (Climate Change)	Site Boundary 1 in 100 Annual Probability +26% Climate Change Extent 1 in 100 Annual Probability +41% Climate Change 		The majority of the site area falls outside of all modelled extents as no detailed modelling is available from the EA for the Elcombe Brook. As such, the equivalent RoFRS mapping is also provided below for completeness The northern section of the site contains areas located in the 1 in 100 AP + 26% (and +41%) climate change modelled flood extent.	

Rivers and Sea (incl Climate Change – 2070-2125)		The RoFRS 1 in 100 AP + CC (2070-2125) was considered over the wider site of the modelled flood extents, due to the significant risk from the non-modelled watercourses highlighted in the adjacent figure. The climate change extent follows a similar outline to the present day scenario, with a slightly more concentrated area through the centre of the site and along the western site boundary.
Surface Water (incl Climate Change)		The majority of the central area of the site is located within a 'Very Low' risk of surface water flooding, with minor localised areas of surface water ponding adjacent to the central area in the centre of the site. The 'High Risk' areas have concentrated and expanded (from the present-day baseline) in the north-eastern area of the site, the Elcombe Brook corridor, and over land drainage routes, particularly in the western area of the site.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The majority of the site area falls outside the 1 in 100 AP plus climate change fluvial flood extent, but the site is significantly impacted by the floodplain along the Elcombe Brook corridor and over the north/northeastern area, while the north-western boundary is partially impacted by the River Ray ordinary watercourse tributary. The key access routes into the site – i.e. Redposts Way (north), Wichel Way (south-west), Mill Lane (south-east) and others – are largely unaffected. Surface Water: The majority of the site is outside the 1 in 100 AP plus climate change surface water flood extent, but 'High Risk' areas follow a similar pattern as the fluvial flooding with the north-eastern area of the site and the Elcombe Brook corridor being affected. Furthermore, other overland drainage routes, particularly in the western area of the site, are a source of flooding. Key access routes remain largely unaffected but some of these may be impacted beyond the site boundary – notably Wichel Way to the south-west – and should be considered further to ensure all dwellings will have continuous safe access.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management.		

Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA.

The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.

Summary of Flood Risk

A summary of the flood risk to the site is provided below:

- The majority of the site is in Flood Zone 1 'Low Probability'. Areas of Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability' are located around the northern area of the site and along the Elcombe Brook corridor through the centre of the site, with lesser areas along the north-west boundary;
- A flood storage area lies in the northern end of the site;
- Detailed EA modelling is available over the northern part of the site. Through the main site area (Elcombe Brook) the RoFRS mapping has been used to inform the assessment.
- The northern area of the site is located in the 'design' 1 in 100 AP +26% climate change extent based on EA detailed modelling. The reference floodplain from the RoFRS + CC confirms the impact focussed on the Elcombe Brook corridor, with further impacts from the ordinary watercourse along the western boundary;
- The RoFSW mapping follows a similar pattern to the river flood risk, with the majority of the site at 'Very low' risk but with surface water flood risk concentrated in the northern area of the site and along the route of the watercourses. The impact is exacerbated with climate change impacts, with more significant isolated ponding across the site.
- The site is not at risk of flooding in the event of a reservoir breach;
- The western corner of the site falls within an area with 'limited potential for groundwater flooding to occur', with most of the site located outside of any areas susceptible to groundwater flooding.
- Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers.
- There is no record of the site having been impacted by historic flood events.

The L1 SFRA confirmed that ground water flood risk is low across the Borough. However, it is recommended that groundwater conditions are confirmed through a commitment to intrusive testing/monitoring so this can be appropriately mitigated if/where necessary.

The majority of the site is at low risk of flooding from all sources. Flood risk from fluvial and pluvial sources is largely concentrated in the northern area of the site and along the Elcombe Brook floodplain through the centre of the site. Climate change impacts are most notable for surface water flood risk, with increased areas of localised ponding across the site and the wider area, potentially impacting on some of the site access routes. Therefore, mitigation may be required to develop the site safely and in accordance with the requirements of the NPPF.

It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.

Implications for New Development

Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development)

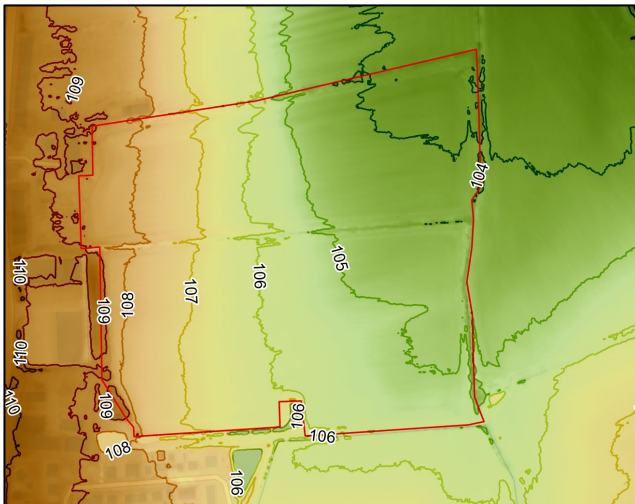
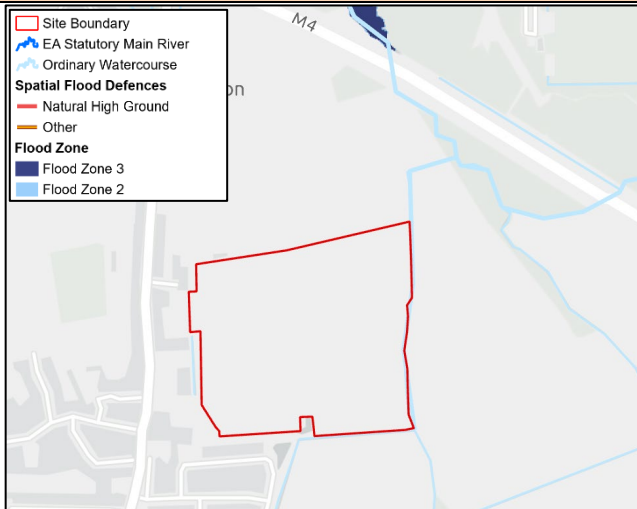
Development is appropriate in Flood Zone 1, over the central, western and eastern sections of the site.

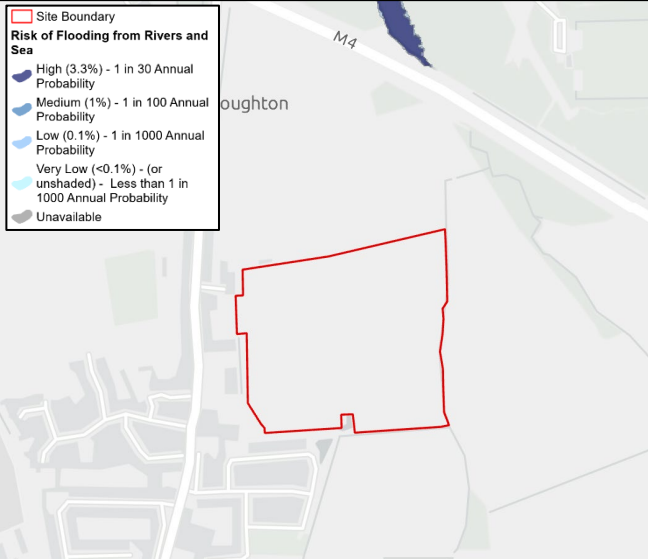
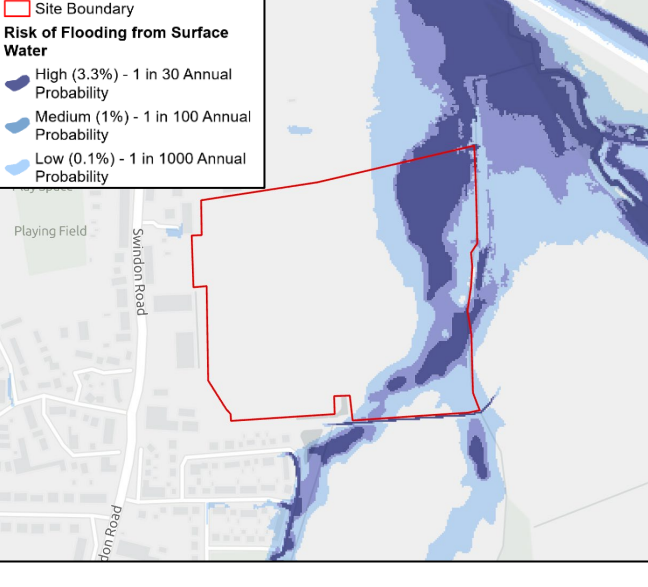
Development in Flood Zone 2 is appropriate, subject to the Sequential Test

Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test

Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.

Planning Recommendations	<u>Spatial Planning</u> The majority of the site is in Flood Zone 1 'Low Probability'. The northern area of the site is within Flood Zone 2 'Medium Probability' and areas of both Flood Zone 3a 'High Probability' of the Elcombe Brook and the River Ray. A review of flood risk within the site has been carried out, and the risk of flooding is largely concentrated in the northern area flowing through the site to the southern site boundary and a thin strip along the western perimeter. Review of the surface water plus climate change extent shows extended surface water flow routes and multiple increased area of ponding across the site area. The access route via Mill Lane remains dry during the surface water 1 in 100 AP event plus climate change, however the wider access route is impacted and may require further consideration. It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26%, allowance for climate change, and a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; 2. . 3. Detailed modelling is advisable for the Elstow Brook and any other significant local watercourses, where no such modelling is available from the EA. This could potentially be avoided as development was a significant offset from any flood risk areas based on the available datasets. In the absence of detailed modelling the outline of the extreme 1 in 1000 AP floodplain could be defined and used as a proxy, with an additional 300mm allowance included in recommendations to allow for the uncertainty; 4. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event; 5. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 6. Crossing of watercourses may be required to facilitate access to parcels of developable and over the site. Where so, these should be in accordance with EA and LLFA requirements – i.e. open span structures set above reference flood levels; 7. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a severe surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA.

18-020- Land East of Swindon Road (SHLAA ref: s0072, Local Plan ref: WR01)					
Grid Reference	SU 15206 81732		Post Code (nearest)	SN4 9BE	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises arable fields. An unnamed Ordinary Watercourse runs along the southern boundary in a western direction, before discharging into another unnamed watercourse at the south eastern corner of the site. This watercourse flows in a northerly direction before discharging into the River Ray, approximately 160m downstream of the site. Where the River Ray passes the site, it is an Ordinary Watercourse, that flows in a north western direction, before becoming an EA Main River approximately 660m downstream.				
Topography				Ground levels fall from west to east and range from 109m AOD to 104m AOD.	
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)				The site is in Flood Zone 1 'Low Probability'.	
Flood Zone 1	100%	Flood Zone 2	0%	Flood Zone 3	0%
Flood Defences	There are no formal flood defences in the area.				

Risk of Flooding from Rivers and Sea (RoFRS)		The entirety of the site is at a 'Very Low' risk.
Modelled Flood Extents (Present Day) (Rivers)	There is no detailed modelling available at the site.	
Risk of Flooding from Surface Water (Present Day)		The western areas are outside all surface water extents. Flooding is concentrated in the eastern area, where there are significant areas ranging from 'Low' to 'High'.
Groundwater	The site is outside of any areas susceptible to groundwater– see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 'Thames Water DG5 Sewer Flooding Records'.	
Historic Flooding Records	The site has not been impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 017 'EA Historic Flood Map'.	

Flood Risk – Climate Change

Climate Change Allowances

The site lies within the 'Gloucestershire and Vale Management Catchment'.

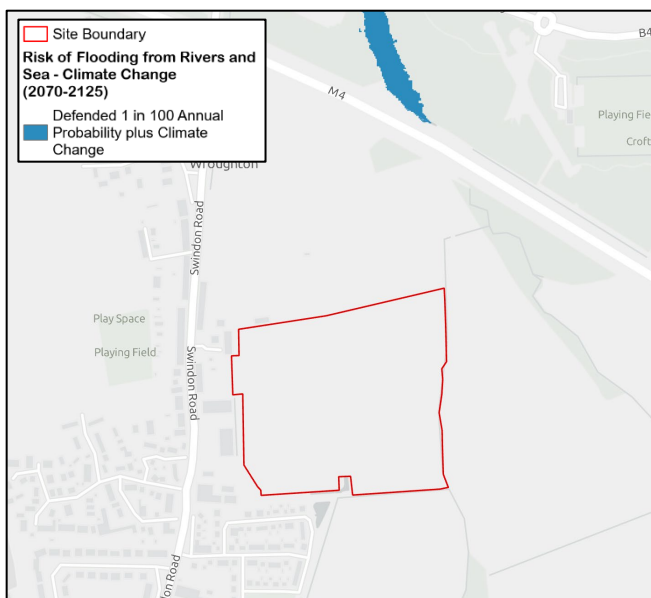
The peak river flow allowances are detailed below:

Management Catchment	Climate Change Allowance 2080's epoch		
	Central	Higher	Upper
<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%

The peak rainfall allowances are detailed below:

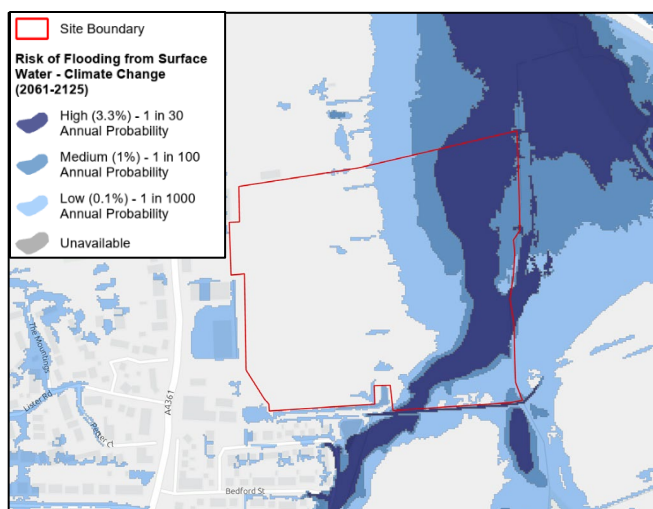
<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)	
	Central	Upper End
3.3% (1 in 30-year) rainfall	+25%	+35%
1% (1 in 100-year) rainfall	+25%	+40%

Modelled Flood Extents (Rivers) (Climate Change)



In the absence of modelled outputs, the RoFRS defended 1 in 100 plus climate change (CC) map shows that the flood extent remains similar to the present-day scenario, with no impacts of flooding within the site.

Surface Water (incl Climate Change)



The majority of the western areas are outside all modelled extents (i.e. 'Very Low' risk), except for minor localised areas in the centre of the site at 'Low' risk only.

Flooding is largely concentrated in the eastern area, where there are significant areas ranging from 'Low' to 'High'.

Safe Access and Emergency Planning

It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood.

Rivers: The site and surrounding area lies outside of Flood Zone 2 and 3.

Surface Water: The western area of the site is outside the 1 in 100 AP plus climate change surface water flood extent. The adjacent access via the Road to the south west of the site and the area of Swindon Road immediately adjacent to the site are outside of the surface water flood extent, however the wider routes are impacted by surface water flooding and may require further consideration.

Management of Surface Water

The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management.

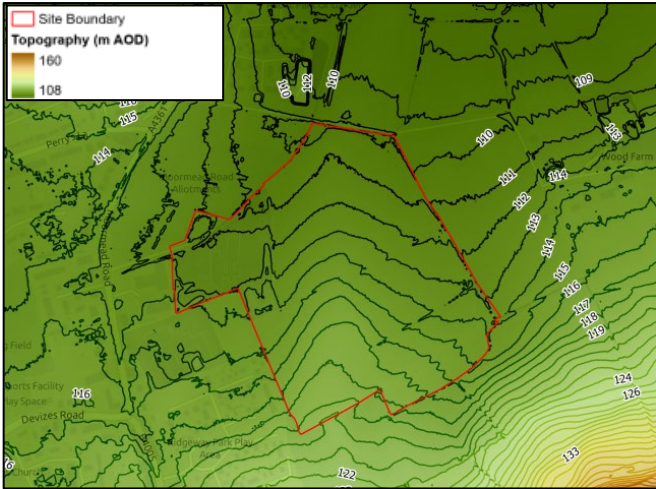
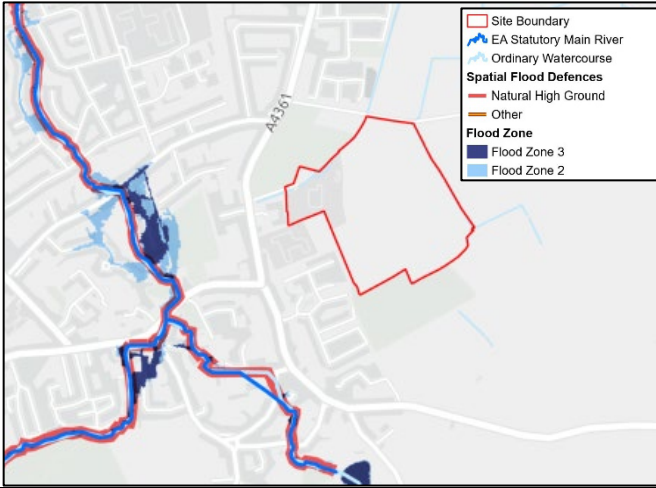
Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA.

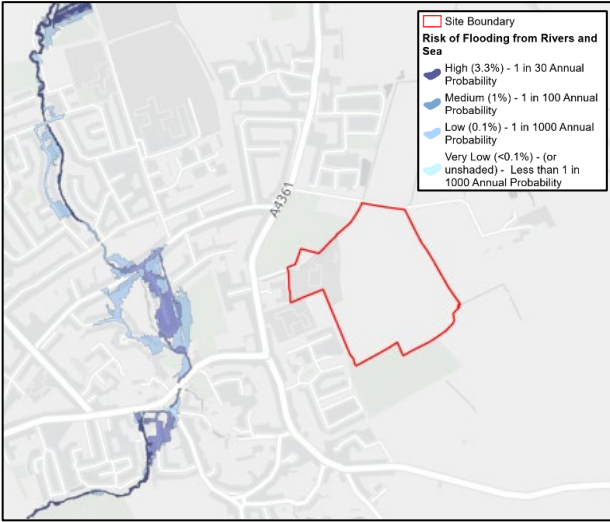
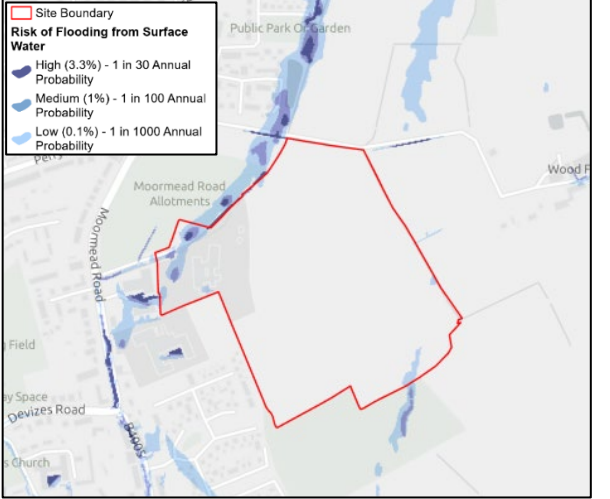
The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.

	Summary of Flood Risk A summary of the flood risk to the site is provided below: • The entirety of the site is in Flood Zone 1 'Low Probability'; • The RoFRS mapping indicates that the entirety of the site is at 'Very Low' risk. • There are no modelled flood extents at the site; • The RoFSW mapping indicates surface water flood risk is concentrated in the eastern area of the site. The majority of the western area of the site is not at risk of surface water flooding. There is also surface water flood risk on the wider access routes to/from the site • The site is not at risk of flooding in the event of a reservoir breach; • The site is not located in an area susceptible to groundwater flooding. • Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers. • There is no record of the site having been impacted by historic flood events. The whole of the site is at 'Very Low' risk of fluvial flooding. Pluvial flooding is largely concentrated in the eastern are of the site. As such it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) Development is appropriate in Flood Zone 1, over the entirety of the site. Development in Flood Zone 2 is appropriate, subject to the Sequential Test Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	<u>Spatial Planning</u> The entirety of the site is in Flood Zone 1 'Low Probability'. The main flood risk to the site is from pluvial flooding, largely concentrated in eastern half of the site. A review of flood risk within the site has been carried out, and the main source of flood risk is from surface water. As pluvial flooding is concentrated in the eastern area of the site it is considered feasible to design the development within the western area, such that it remains safe throughout the lifetime of the development. The adjacent access via the Road to the south west of the site and the area of Swindon Road immediately adjacent to the site are outside of the surface water flood extent, however the wider routes are impacted by surface water flooding and may require further consideration. It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.

Design Recommendations

1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP +26% allowance for climate change flood level, and a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event;
2. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event;
3. Detailed modelling of the pluvial impacts is recommended to verify the flood risk from this source, unless the identified floodplain (RoFSW mapping) can be excluded from development along with a significant buffer offset;
4. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements;
5. The entirety of the site and surrounding area are at 'Very Low' risk of fluvial flooding and therefore safe access is available. In a severe surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA;
6. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';

WR02 (18-022) - Akers Land (Western Side) (SHLAA ref: s0427b)					
Grid Reference	SU1516080751		Post Code (nearest)	SN4 0GH	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site area comprises largely open grassland, with a hospice facility located in the western corner of the site. The eastern part of the site is bordered by further grassland while the western half is bordered by allotments (north), residential properties and healthcare facilities. Access to the site is via Moormead Road to the west of the site (adjacent to Prospect Hospice) or a local residential road to the north of the site through Swindon Road (A4361). Small land drianage channels (tributaries of the River Ray) flow north along the western and eastern site boundaries. There are no local 'main river' watercourses.				
Topography				Ground levels fall from 119m AOD in the south to 110m AOD to the north.	
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)				The site is fully in Flood Zone 1 'Low Probability'	
Flood Zone 1	100%	Flood Zone 2	0%	Flood Zone 3	0%
Flood Defences	There are no formal flood defences in the area.				

Risk of Flooding from Rivers and Sea (RoFRS)		The entire site area is at 'Very low' risk – i.e. outside the extreme 1 in 1000 annual probability (AP) extent.
Modelled Flood Extents (Present Day) (Rivers)	There are no modelled flood extents for the site area.	
Risk of Flooding from Surface Water (Present Day)		The majority of the site is at 'Very Low' risk and outside all surface water extents. A localised area across the western part of the site is impacted primarily in the 'Low' risk scenario, as is an isolated area on the southern boundary.
Groundwater	The site is outside of any areas susceptible to groundwater flooding – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 018 'Thames Water DG5 Sewer Flooding Records'.	
Historic Flooding Records	There are no records of the site being impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 016 'EA Historic Flood Map'.	

Flood Risk – Climate Change

Climate Change Allowances

The site lies within the 'Gloucestershire and Vale Management Catchment'.

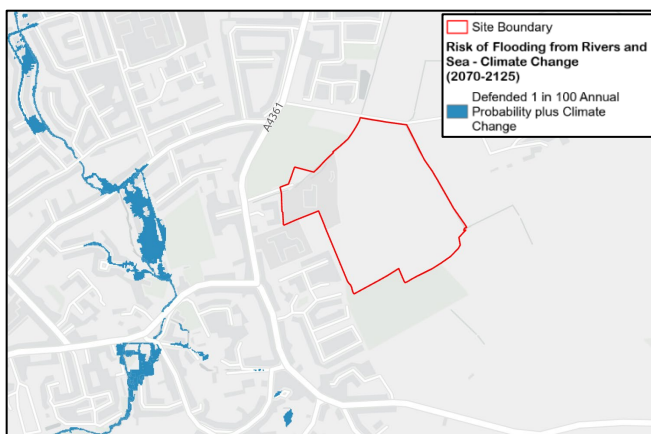
The peak river flow allowances are detailed below:

Management Catchment	Climate Change Allowance 2080's epoch		
	Central	Higher	Upper
<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%

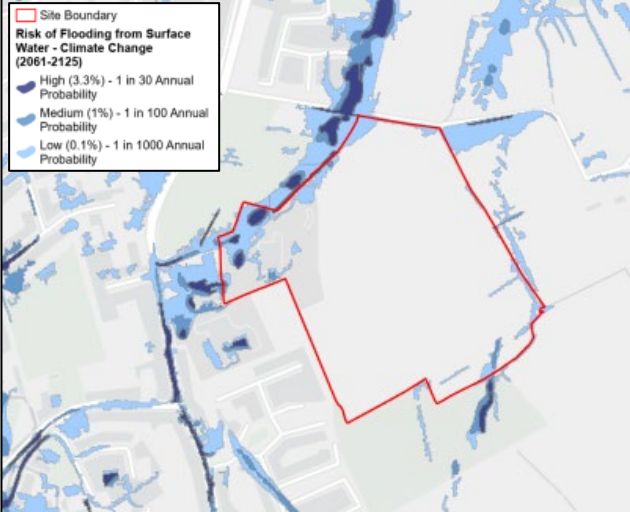
The peak rainfall allowances are detailed below:

<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)	
	<i>Central</i>	<i>Upper End</i>
3.3% (1 in 30-year) rainfall	+25%	+35%
1% (1 in 100-year) rainfall	+25%	+40%

Modelled Flood Extents (Rivers) (Climate Change)

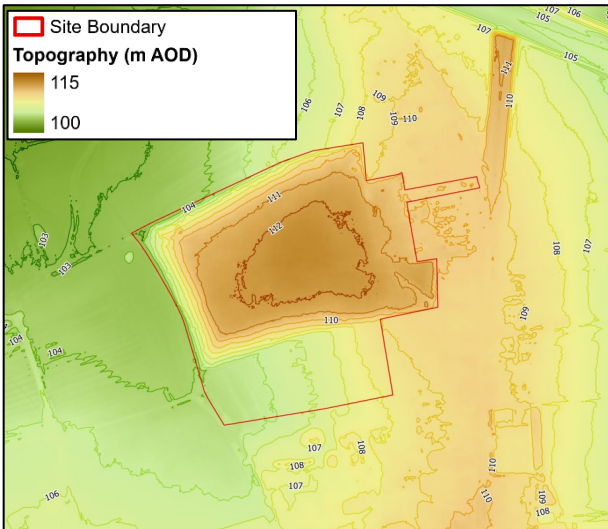
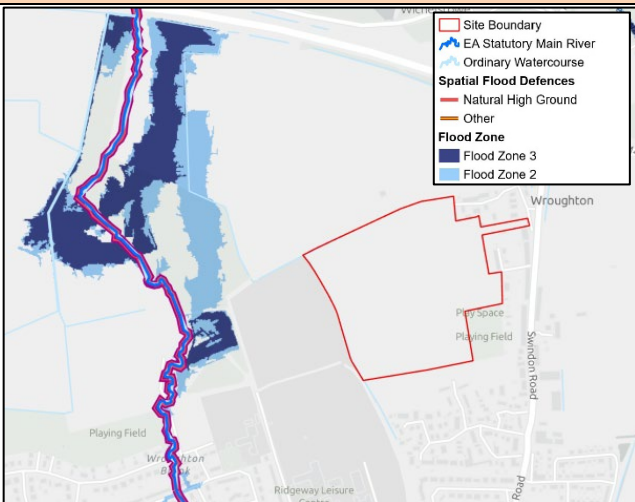


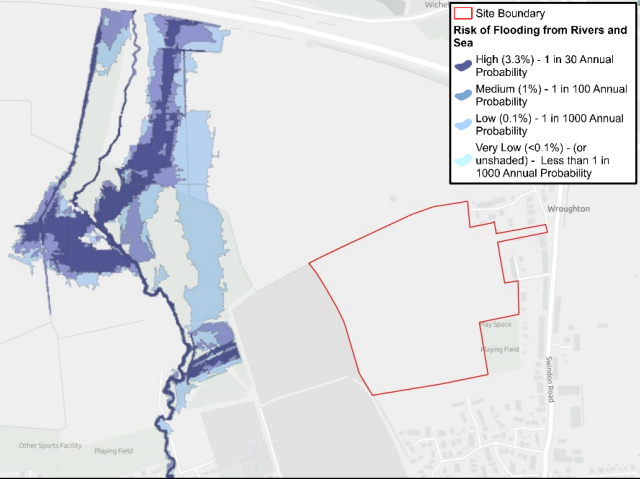
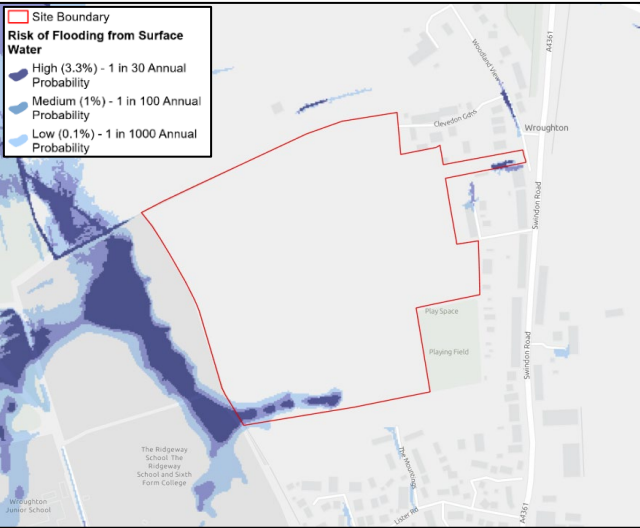
In the absence of modelled outputs, the RoFRS plus climate change (CC) map shows that the flood extent remains similar to the present-day scenario, with no impacts of flooding within the site.

Surface Water (incl Climate Change)		The RoFSW CC map shows that majority of the site remains at 'Very Low' risk of surface water flooding. The flooding in the western site area is more concentrated and extensive, but remains primarily at 'Low' risk (with some isolated ponding at 'High' risk). Further localised areas at 'Low' risk are present in the south-eastern part of the site.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The entire site area is located outside the 1 in 100 AP plus climate change fluvial flood extent, with both adjacent access points via Moormead Road and local residential road (north of the site) located outside of the fluvial floodplain. Surface Water: The majority area of the site is outside the 1 in 100 AP plus climate change surface water flood extent. The western corner of the site, including the access route via Moormead Road, is impacted by 'Low' risk surface water flooding and may require further consideration. The alternate access route via a local residential road (north of the site) is also partially impacted by surface water flooding.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

	Summary of Flood Risk A summary of the flood risk to the site is provided below: • The entire site is in Flood Zone 1 'Low Probability'; • There are no detailed modelled flood extents for the site area. The RoFRS mapping indicates that the entire site area lies within a 'Very Low' risk area of flooding from rivers (or sea); • The RoFRS mapping indicates that majority of the site lies in a 'Very Low' risk of surface water flooding, except minor concentrated areas in the western corner and south-eastern area of the site. There is also surface water flood risk along the access routes to/from the site (Moormead Road and local road via Swindon Road). • The site is not at risk of flooding in the event of a reservoir breach; • The site is not located in an area susceptible to groundwater flooding. • Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers. • There is no record of the site having been impacted by historic flood events. The majority of the site is at 'Very Low' risk of flooding from all sources of flooding, including fluvial sources. Surface water flooding is largely concentrated in the western area of the site, with some areas in the south-west also impacted. As such it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) Development is appropriate in Flood Zone 1, over the entire site. Development in Flood Zone 2 is appropriate, subject to the Sequential Test Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	<u>Spatial Planning</u> The entire site is in Flood Zone 1 'Low Probability'. A review of flood risk within the site has been carried out, and it is considered feasible to design the development such that it remains safe throughout the lifetime of the development. Surface water flooding impacts the western corner of the site via Moormead Road (albeit only in extreme scenarios) and north of the site along the local residential road linked to Swindon Road (A4361), so may require further consideration. It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event;

	2. Since the site is not impacted by fluvial floodplain, the proposed development will not cause a detriment to the available storage floodplain during the 1 in 100 AP + climate change flood event; 3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 4. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a severe surface water flood event, safe access to the site via Moormead Road and local residential road are both impacted by surface water flooding and should be considered further in the FRA; 5. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';
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WR03 (18-023) - Land off Swindon Road (SHLAA ref: s0114)					
Grid Reference	SU1481781787		Post Code (nearest)	SN4 9EZ	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises largely undeveloped grassland, bordered by similar grasslands to the north and west of the site, with residential properties to the south and east. Access to the site can be gained via Clevedon Gardens or a slip road through the nearby residential development adjacent to Swindon Road (A4361). The Wroughton Beck (EA Main River) is the only relevant local watercourse located approximately 300m east from the site. The Beck flows in a northerly direction before its confluence with the River Ray, approxiamtely 1.2km north of the site.				
Topography				Ground level falls from the top of a mound in the northern part of the site towards all directions. The topography ranges from approximately 112m AOD at the top of the mound to approximately 103m AOD in the north-west corner of the site.	
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)				The site is fully in Flood Zone 1 'Low Probability'.	
Flood Zone 1	100%	Flood Zone 2	0%	Flood Zone 3	0%
Flood Defences	There are no formal flood defences in the area.				

Risk of Flooding from Rivers and Sea (RoFRS)		The entire site area is at 'Very low' risk. In the absence of equivalent modelled outputs, the RoFRS 1 in 30 annual probability (AP) extent indicates that the entirety of the site remains outside of the Flood Zone 3b 'Functional Floodplain'.
Modelled Flood Extents (Present Day) (Rivers)	There are no modelled flood extents for the site area.	
Risk of Flooding from Surface Water (Present Day)		Most of the site is at a 'Very Low' risk of surface water flooding. The exceptions to the above are a small concentrated area in the north-eastern corner on access from Clevedon Gardens and a more significant zone of flood risk along the south-western corner of the site, both of which are ranging between 'Low' to 'High' risk.
Groundwater	The site is outside of any areas susceptible to groundwater flooding – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. Thames Water DG5 sewer flooding records indicates that the site lies in a postcode area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 018 'Thames Water DG5 Sewer Flooding Records'.	
Historic Flooding Records	There are no records of the site having been impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 016 'EA Historic Flood Map'.	

Flood Risk – Climate Change

Climate Change Allowances

The site lies within the 'Gloucestershire and Vale Management Catchment'.

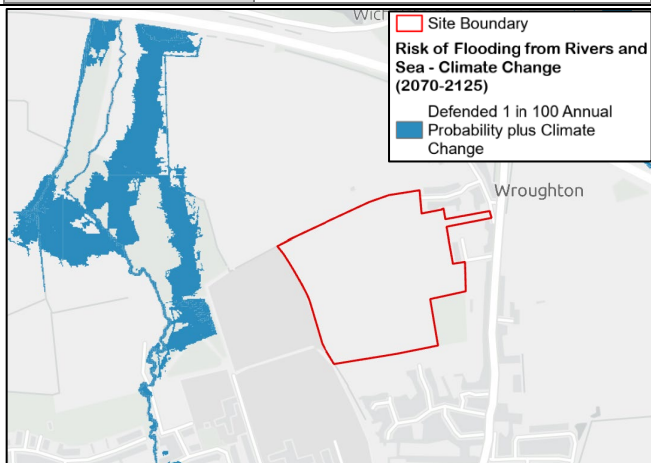
The peak river flow allowances are detailed below:

Management Catchment	Climate Change Allowance 2080's epoch		
	Central	Higher	Upper
<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%

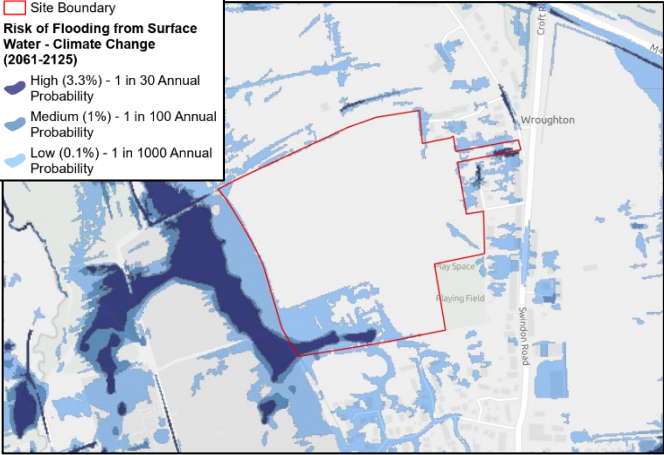
The peak rainfall allowances are detailed below:

<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)	
	Central	Upper End
3.3% (1 in 30-year) rainfall	+25%	+35%
1% (1 in 100-year) rainfall	+25%	+40%

Modelled Flood Extents (Rivers) (Climate Change)



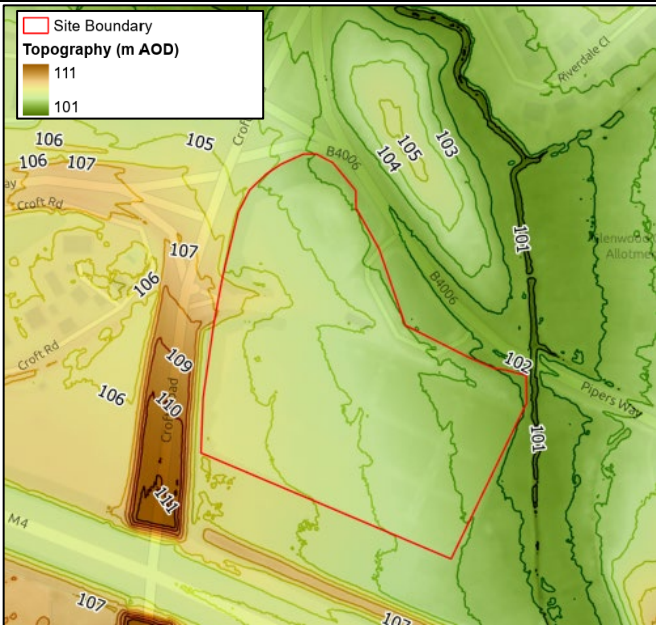
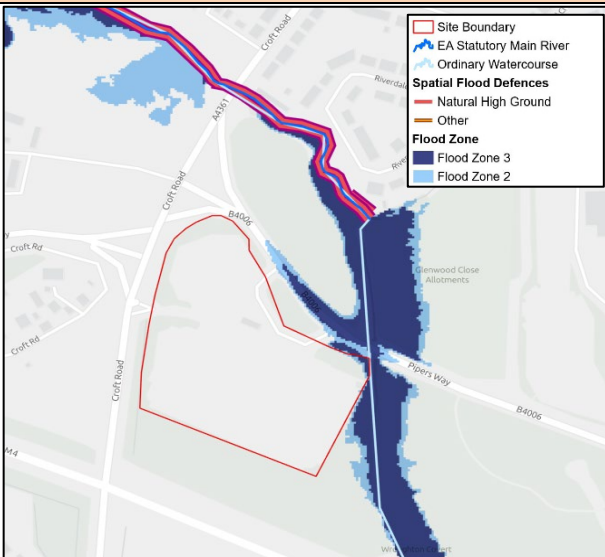
In the absence of modelled outputs, the RoFRS defended 1 in 100 plus climate change (CC) map shows that the flood extent remains similar to the present-day scenario, with no impacts of flooding within the site.

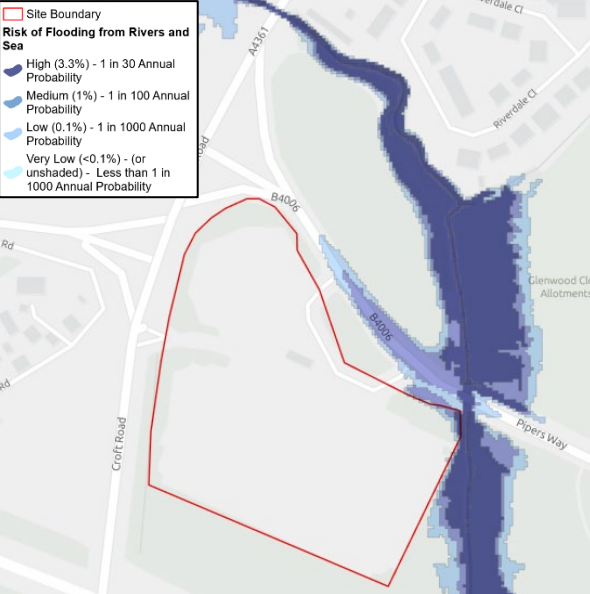
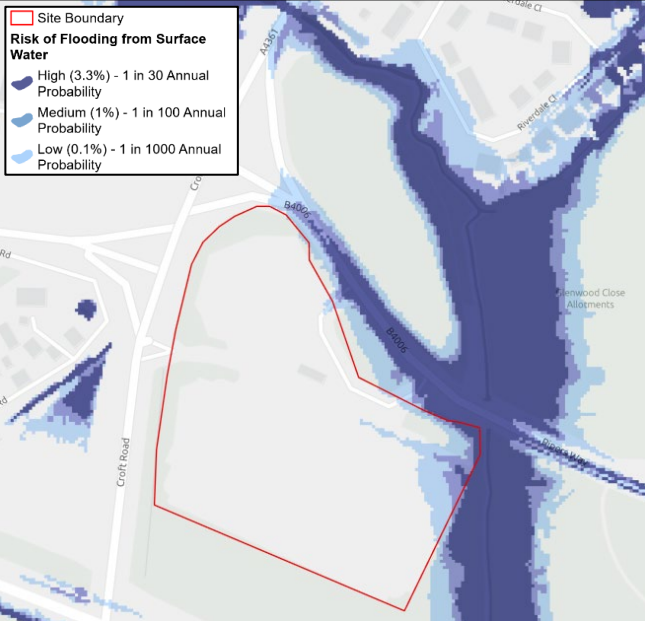
Surface Water (incl Climate Change)		The RoFSW CC map shows that majority of the site is at 'Very Low' risk of surface water flooding. Areas of high risk extent broadly consistent with present day scenario, but more extensive areas of 'low' risk is present in the south-western corner of the site. The site also contains isolated areas of ponding along the east side of the site.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The entire site area is located outside the 1 in 100 AP plus climate change fluvial flood extent, as is the adjacent route via Clevedon Gardens connected to Swindon Road (A4361). Surface Water: The majority area of the site is outside the 1 in 100 AP plus climate change surface water flood extent. Some parts of adjacent access route via Clevedons Gardens and Swindon Road (A4361) towards Marlborough Road are impacted by surface water flooding and may require further consideration. Based on the RoFSW mapping, access to the site during this scenario can be gained via the access road directly east of the site linked to Swindon Road (A4361) towards the M4.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

	Summary of Flood Risk A summary of the flood risk to the site is provided below: • The entire site area is in Flood Zone 1 'Low Probability'; • The RoFRS mapping indicates that the entire site falls within a 'Very Low' risk area of flooding from rivers (or sea); • There are no modelled flood extents for the site area; • The RoFSW mapping indicates that majority of the site lies in a 'Very Low' risk of surface water flooding, except for minor concentrated areas in the north-eastern corner and along the south-western corner of the site ranging between 'Low' to 'High' risk. There is also surface water flood risk along the access routes on the east side of the site via Swindon Road (A4361); • The site is not at risk of flooding in the event of a reservoir breach; • The site is not located in an area susceptible to groundwater flooding. • Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers. • There are no records of the site having been impacted by historic flood events. Majority of the site is at very low risk of flooding from all sources, including fluvial sources. The south-western corner of the site is at risk of flooding from surface water. As such it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) Development is appropriate in Flood Zone 1, over the entire site. Development in Flood Zone 2 is appropriate, subject to the Sequential Test Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	Spatial Planning The entire site area is in Flood Zone 1 'Low Probability'. A review of flood risk within the site has been carried out, and as the risk of flooding is largely concentrated in the south-western area of the site it is considered feasible to design the development within the remaining areas, such that it remains safe throughout the lifetime of the development. Surface water flooding impacts safe access in the north-eastern corner of the site via Clevedons Gardens and Swindon Road (A4361) and may require further consideration. However, access to the site during this scenario can be gained via the alternate access road directly east of the site linked to Swindon Road (A4361) towards the M4. It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.

Design Recommendations

1. Finished floor levels within the site should be a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event;
2. Since the site is not impacted by fluvial floodplain, the proposed development will not cause a detriment to the available floodplain storage during the 1 in 100 AP + climate change flood event;
3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements;
4. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a severe surface water flood event, access routes to the site via Clevedon Gardens in the north-east corner of the site is impacted by surface water flooding and should be considered further in the FRA. Possible access to the site during this scenario can be gained via the access road directly east of the site linked to Swindon Road (A4361) towards the M4;
5. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';

PW04 (18-027)- Former Wroughton Park and Ride (SHLAA ref: s0297)					
Grid Reference	SU151738227		Post Code (nearest)	SN1 4EG	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises a car park. Croft Road (A4361) and the M4 Motorway are located next to the western and southern site boundary respectively. Access to the site is via Pipers Way (B4006) to the north of the site. The River Ray (EA Main River) borders part of the eastern boundary of the site and flows in a north westerly direction.				
Topography				Ground levels fall from south-west to north-east. The topography ranges from approximately 107m AOD near the western site boundary to 102m AOD along the north-eastern section adjacent to Pipers Way.	
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)				Almost the entirety of the site is in Flood Zone 1 'Low Probability'. A minor area in the eastern corner of the site is in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'.	
Flood Zone 1	99.2%	Flood Zone 2	0.4%	Flood Zone 3	0.4%
Flood Defences	There are no formal flood defences in the area, however the site benefits from natural high ground located north of the site.				

Risk of Flooding from Rivers and Sea (RoFRS)		Almost the entirety of the site sits at a 'Very low' risk of flooding. A very small area in the eastern corner contains areas at a 'Low' to 'High' risk of flooding. In the absence of equivalent modelled outputs, the RoFRS 1 in 30 annual probability (AP) extent indicates that the eastern corner of the site borders the Flood Zone 3b 'Functional Floodplain', with very marginal encroachment in the eastern corner.
Modelled Flood Extents (Present Day) (Rivers)	There are no modelled flood extents for the site area.	
Risk of Flooding from Surface Water (Present Day)		The majority of the site is at a 'Very Low' risk of flooding from surface water. Surface water flooding is largely concentrated along Pipers Way (B4006) northeast of the site and in the River Ray floodplain east of the site. Surface water flooding encroaches into a small section of the eastern corner of the site, with areas ranging from 'Low' to 'High'.
Groundwater	The eastern corner of the site falls within an area which has '<i>potential for groundwater flooding to occur at surface</i>' – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'. Note this designation typically coincided with low lying ground along river valleys, and is from a national scale dataset based on published underlying geology.	
Reservoirs and other sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. Thames Water DG5 sewer flooding records indicates that the site lies in a postcode area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 018 'Thames Water DG5 Sewer Flooding Records'.	
Historic Flooding Records	There are no records of the site having been impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 016 'EA Historic Flood Map'.	

Flood Risk – Climate Change

Climate Change Allowances

The site lies within the 'Gloucestershire and Vale Management Catchment'.

The peak river flow allowances are detailed below:

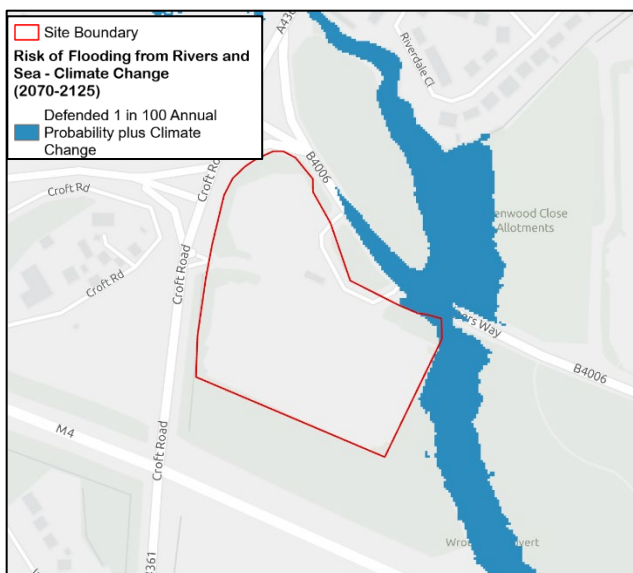
Management Catchment	Climate Change Allowance 2080's epoch		
	Central	Higher	Upper
<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%

The peak rainfall allowances are detailed below:

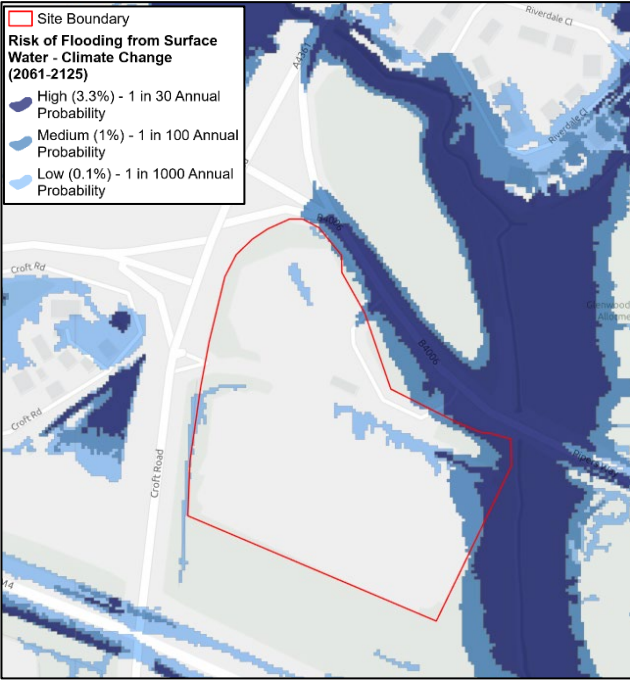
<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)	
	<i>Central</i>	<i>Upper End</i>
3.3% (1 in 30-year) rainfall	+25%	+35%
1% (1 in 100-year) rainfall	+25%	+40%

Modelled Flood Extents

(Rivers - Climate Change)

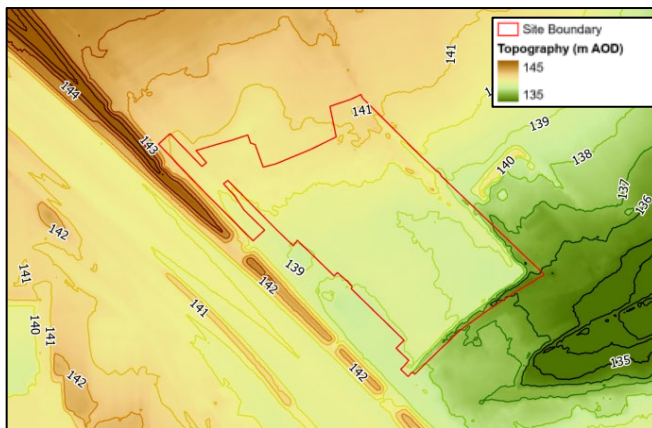


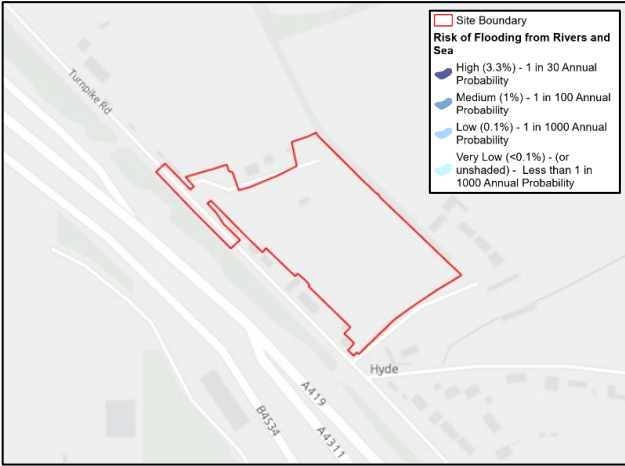
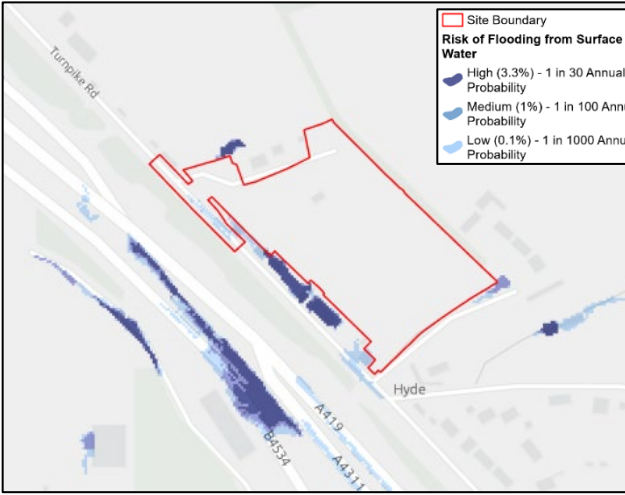
In the absence of modelled outputs, the RoFRS defended 1 in 100 plus climate change (CC) map shows that the flood extent remains similar to the present-day scenario, with minimal changes to flooding within the site.

Surface Water (incl Climate Change)		The RoFSW CC map shows that the majority of the site is at a 'Very Low' risk of surface water flooding. Surface water flooding within the site follows a similar outline as the present-day scenario, with the 'Low' flood risk encroaching the western perimeter and eastern corner, further extending towards the centre of the site. 'Medium' flood risk follows the north-eastern perimeter of the site boundary, with a wider section in the eastern corner of the site boundary being impacted by 'Medium' and 'High' flood risk.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The majority of the site is located outside the 1 in 100 AP plus climate change fluvial flood extent, however the adjacent access via Piper Way (B4006) to the north is impacted by flooding ranging from 'Low' to 'High' risk. Safe access is still available via Croft Road (A4361) to the east. Surface Water: The majority of the site area is outside the 1 in 100 AP plus climate change surface water flood extent. The adjacent access via Piper Way (B4006) to the north is impacted by surface water flooding, but safe access is still available via Croft Road (A4361).		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

	Summary of Flood Risk A summary of the flood risk to the site is provided below: • Almost all of the site area is in Flood Zone 1 'Low Probability', with minor areas in the eastern corner of the site boundary being encroached by Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'; • The RoFRS mapping indicates that almost all of the site is at 'Very Low' risk of flooding, with only a minor area along the eastern boundary falling within Flood Zones 2 and 3 • There are no modelled flood extents for the site area; • The RoFSW mapping indicates that almost all of the site is at 'Very Low' risk of surface water flooding. A small corner in the eastern site boundary falls within 'Low' to 'High' risk of surface water flooding. • There is a risk from fluvial and surface water sources along a potential access on Pipers Way to the immediate north. Safe access remains available via Croft Road (A4361) along the west of the site. • The site is not at risk of flooding in the event of a reservoir breach; • The northeastern corner of the site falls within an area identified as having 'potential for groundwater flooding to occur at surface'. It is recommended that intrusive testing is undertaken at design stage to verify groundwater conditions so these can be mitigated accordingly. • Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers. • There is no record of the site having been impacted by historic flood events. The majority of the site is at very low risk from all sources of flooding, with flood risk from fluvial and pluvial sources constrained to the eastern corner of the site. As such it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) • Development is appropriate in Flood Zone 1, over the majority of the site. • Development in Flood Zone 2 is appropriate, subject to the Sequential Test • Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test • Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	Spatial Planning Majority of the site area is in Flood Zone 1 'Low Probability'. A small section in the eastern corner is within Flood Zone 2 'Medium Probability' and encroaching areas of both Flood Zone 3a 'High Probability' and Flood Zone 3b 'Functional Floodplain' of the River Ray. A review of flood risk within the site has been carried out, and as the risk of flooding is isolated in the eastern corner of the site it is considered feasible to design the development, such that it remains safe throughout the lifetime of the development. Although access to the site is potentially impacted along Pipers Way to the north, safe access is still available via Croft Road to the west.

	If development is proposed within Flood Zone 3 then further detailed modelling would be required to verify the extent of the 1 in 30 AP Flood Zone 3b Functional Floodplain' (since the current extent is based on the national scale RoFRS mapping only). It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26% allowance for climate change. In the absence of detailed modelling the outline of the extreme 1 in 1000 AP floodplain could be defined and used as a proxy, with an additional 300mm allowance included in recommendations to allow for the uncertainty. The development should be set a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; 2. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event; 3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 4. Safe access to the site via Croft Road (A4361) is available in the current 1 in 100 AP plus climate change fluvial flood event. In a severe surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA; 5. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability'.

BB03 (18-032) - Land at 12 Turnpike Road, Blunsdon (Marrons/Bellway Homes) (SHLAA ref: s0460)					
Grid Reference	SU1515989734		Post Code (nearest)	SN26 7EA	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises predominantly open grassland, with a small number of residential properties intermittently bordering the north and west boundaries. The north-western corner of the site extends onto Turnpike Road to provide access. The site is bordered by a brownfield site to the immediate east, further grassland to the north and wider eastern area, more residential properties to the south and the A419 Blunsdon Bypass further west. A land drainage channel (ordinary watercourse) tributary of the Bydemill Brook lies approximately 50m south-east of the site, flowing north-east.				
Topography				Ground levels generally fall from north-west to south-east. Topography at the site ranges from approximately 141m AOD to the north of the site to approximately 136m AOD to the south-eastern corner of the site.	
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)				The site area lies in Flood Zone 1 'Low Probability'.	
Flood Zone 1	100%	Flood Zone 2	0%	Flood Zone 3	0%
Flood Defences	There are no formal flood defences in the area.				

Risk of Flooding from Rivers and Sea (RoFRS)		The entire site area is at 'Very low' risk – i.e. outside the extreme 1 in 1000 annual probability (AP) extent.
Modelled Flood Extents (Present Day) (Rivers)	There are no modelled flood extents for this site area.	
Risk of Flooding from Surface Water (Present Day)		The majority of the site lies outside of the surface water flood extents (i.e. 'Very Low' risk), except for a small, isolated area along Turnpike Road that falls within a 'Low' risk area. Higher risk areas (Medium to High) associated with isolated ponding, border the site boundary along the western side and south-eastern corner.
Groundwater	The entire site falls within an area with '<i>limited potential for groundwater flooding to occur</i>', – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other sources	The site is at risk of reservoir flooding when river levels are normal – see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. The site is not shown at risk of reservoir flooding when rivers are also in flood, and it is not clear what mechanisms cause this discrepancy. It should be emphasised that the risk of flooding from a reservoir breach is very small. The EA is the enforcement authority for the Reservoirs Act (1975) and there is a mandatory requirement for all large, raised reservoirs to be inspected and supervised by reservoir panel engineers. Thames Water DG5 sewer flooding records indicates that the site lies in an area where between 0-5 properties are at risk of flooding from sewers – see Level 1 SFRA – Figure 018 'Thames Water DG5 Sewer Flooding Records'.	
Historic Flooding Records	There are no records of the site being impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 016 'EA Historic Flood Map'.	

Flood Risk – Climate Change

Climate Change Allowances

The site lies within the 'Gloucestershire and Vale Management Catchment'.

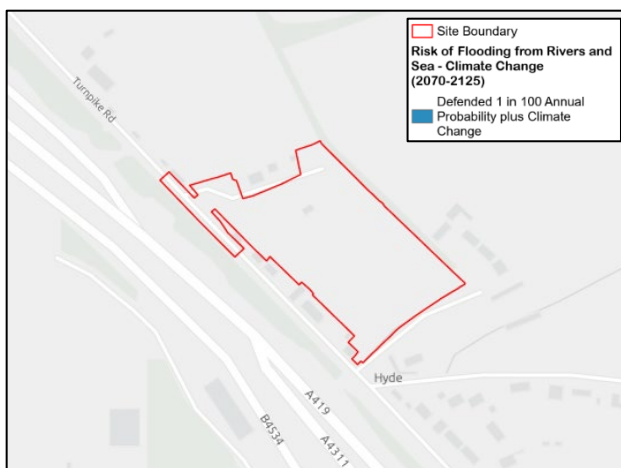
The peak river flow allowances are detailed below:

Management Catchment	Climate Change Allowance 2080's epoch		
	Central	Higher	Upper
<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%

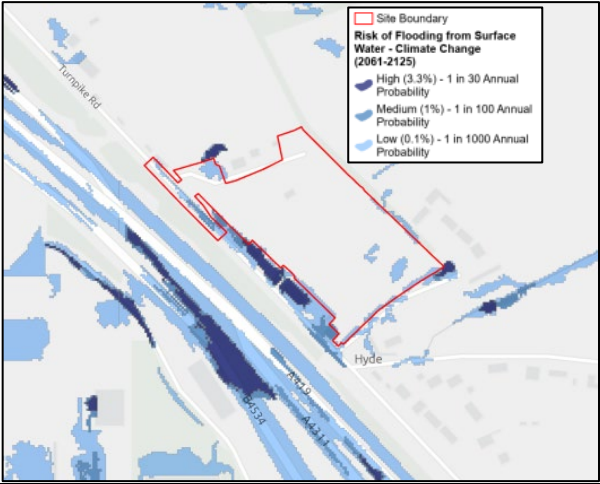
The peak rainfall allowances are detailed below:

<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)	
	<i>Central</i>	<i>Upper End</i>
3.3% (1 in 30-year) rainfall	+25%	+35%
1% (1 in 100-year) rainfall	+25%	+40%

Modelled Flood Extents (Rivers) (Climate Change)

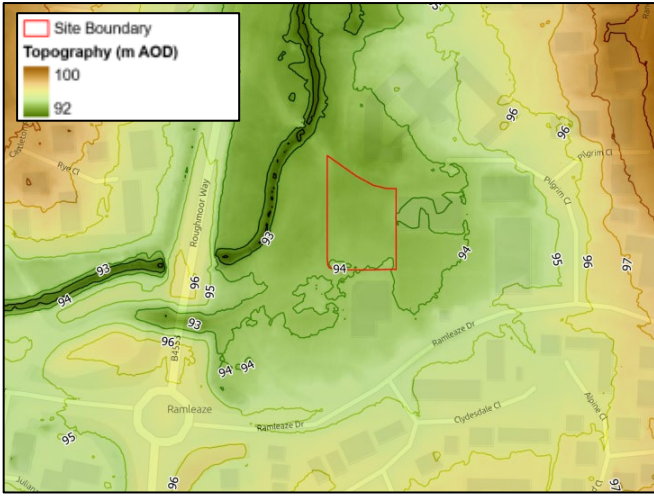
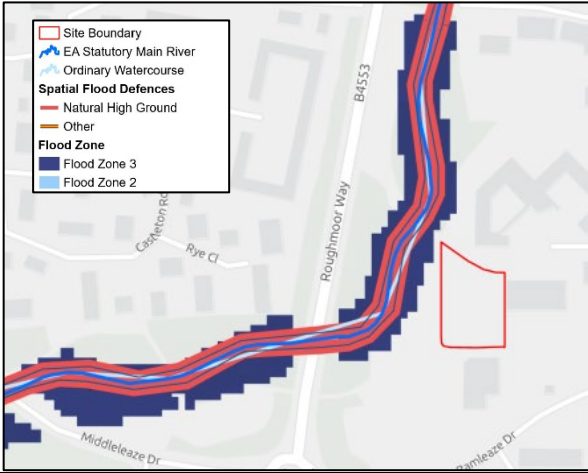


In the absence of modelled outputs, the RoFRS plus climate change (CC) map has been considered. This shows that there are no impacts of flooding within the site or in the immediate vicinity.

Surface Water (incl Climate Change)		Most of the site remains within a 'Very Low' risk of surface water flooding, with minor localised areas in the south-eastern area of the site at 'Low' risk. The areas of higher risk is generally consistent with – but marginally greater than – the present day scenario, with flooding largely concentrated beyond the western boundary of the site along Turnpike Road, encroaching into the north-western corner of the site.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The entire site area falls outside the 1 in 100 AP plus climate change fluvial flood extent, as is the adjacent access via the Turnpike Road connected to A419 Motorway. Surface Water: The central area of the site is outside the 1 in 100 AP plus climate change surface water flood extent. The adjacent access via Turnpike Road is partially impacted by surface water flooding and may require further consideration.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		
	Summary of Flood Risk A summary of the flood risk to the site is provided below: • The site is wholly in Flood Zone 1 'Low Probability'; • The site lies outside of any detailed EA modelled climate change flood extents. IN their absence the RoFRS mapping confirms indicates that entire site lies in a 'Very Low' risk area of flooding from rivers (or sea), allowing for climate change; • The RoFSW mapping indicates that majority of the site lies is at 'Very Low' risk of surface water flooding. There is an area at increased risk along the western side of the site, with isolated ('Low' risk) areas of ponding in the climate change scenario. Surface water flood risk is present on the wider access routes.	

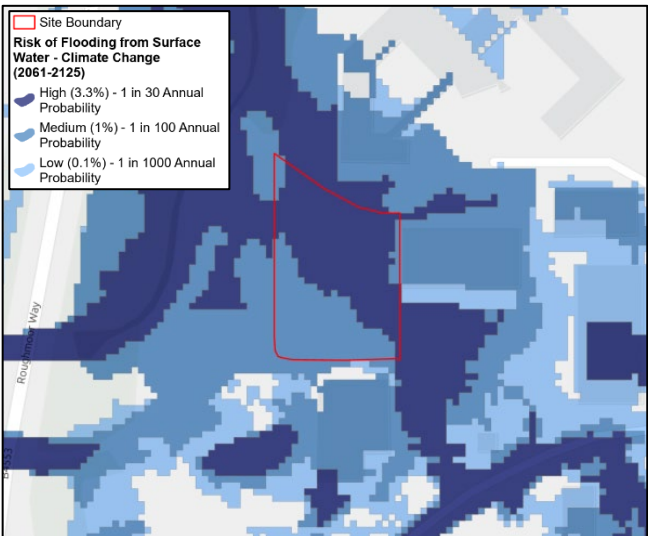
	- The site is at risk of flooding in the event of a reservoir breach when river levels are normal. However, it should be emphasised that the risk of flooding from a reservoir breach is very small. - The site is located in an area with limited potential for groundwater flooding to occur. - Thames Water DG5 sewer flooding records indicates that the site lies in an area where between 0-5 properties are at risk of flooding from sewers. - There is no record of the site having been impacted by historic flood events. It is recommended that groundwater conditions are confirmed through a commitment to intrusive testing/monitoring so this can be appropriately mitigated if/where necessary. The site is at low risk of flooding from fluvial sources. Pluvial flooding is largely concentrated beyond the western boundary of the site area, with some isolated areas of ponding across the site in extreme events. As such it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development)	
Development is appropriate in Flood Zone 1, over the whole site.	
Development in Flood Zone 2 is appropriate, subject to the Sequential Test	
Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test	
Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	<u>Spatial Planning</u> The site area is in Flood Zone 1 'Low Probability'. A review of flood risk within the site has been carried out, and it is considered feasible to design the development such that it remains safe throughout the lifetime of the development. Surface water flooding impacts access to the site via Turnpike Road in the western corner of the site and should be further assessed. It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> - Finished floor levels within the site should be a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; - Since the site is not impacted by fluvial floodplain, the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event; - Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; - Safe access to the site is available in terms of fluvial flood risk. The access is partially impacted during the extreme surface water flood events and should be considered further in the FRA;

	5. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';
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18-033- Site at Shaw Village Centre (SHLAA ref: s0532)					
Grid Reference	SU1126585457		Post Code (nearest)	SN5 5PY	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises mostly open grassland, with a small garden area attached to the Holy Trinity Chruch building located in the eastern corner of the site boundary. The site is bordered by grassland to the west, sheltered housing to the north, the Holy Trinity Church (and car park), to the immediate east and The Village Inn directly south of the site. Access is via the car park connected to Ramleaze Drive, or Pilgrim Close to the east. Shaw Brook (EA Main River) is the nearest watercourse located approximately 20m north-west of the site. The Shaw Brook runs flows in a northerly direction, outfalling into the Lydiard Brook approximately 750m north of the site.				
Topography				Ground levels at the site are generally flat, with topography at the site at approximately 94m AOD.	
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)				The site area lies in Flood Zone 1 'Low Probability'.	
Flood Zone 1	100%	Flood Zone 2	0%	Flood Zone 3	0%
Flood Defences	There are no formal flood defences in the area.				

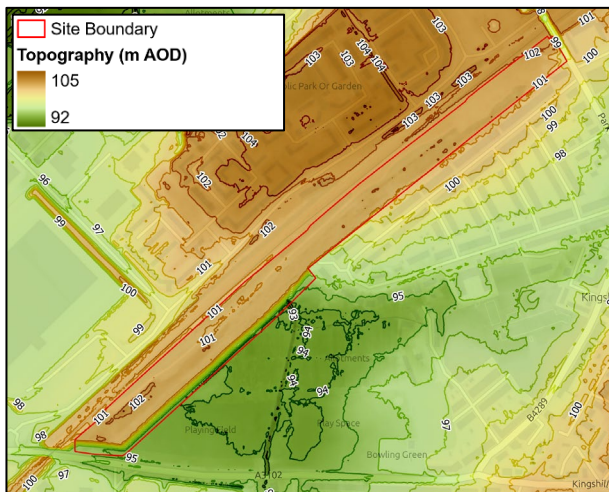
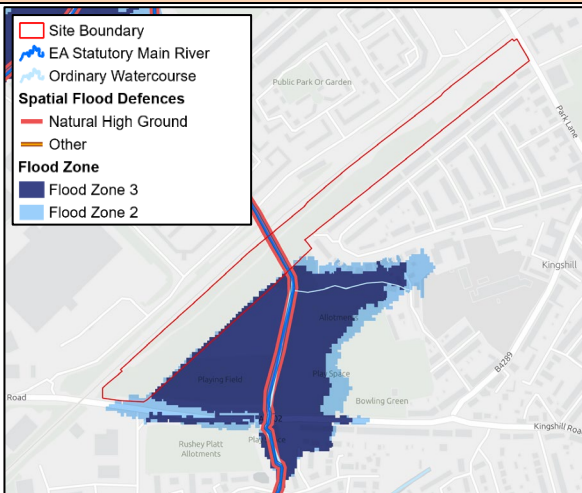
Risk of Flooding from Rivers and Sea (RoFRS)	Site Boundary Risk of Flooding from Rivers and Sea High (3.3%) - 1 in 30 Annual Probability Medium (1%) - 1 in 100 Annual Probability Low (0.1%) - 1 in 1000 Annual Probability Very Low (<0.1%) - (or unshaded) - Less than 1 in 1000 Annual Probability	The site is located in the 'Very Low' risk area. A narrow corridor of 'High' risk follows the Shaw Brook river channel, on the western side of the site.
Modelled Flood Extents (Present Day) (Rivers)	Site Boundary 1 in 20 Annual Probability Flood Extent 1 in 100 Annual Probability Flood Extent 1 in 1000 Annual Probability Flood Extent	The entire area of the site is outside all modelled extents.
Risk of Flooding from Surface Water (Present Day)	Site Boundary Risk of Flooding from Surface Water High (3.3%) - 1 in 30 Annual Probability Medium (1%) - 1 in 100 Annual Probability Low (0.1%) - 1 in 1000 Annual Probability	The site is significantly impacted by surface water extents, with the majority of the northern and central areas of the site located within the 'High' and 'Medium' risk areas, on a flow route running north-west to the watercourse. The remaining south-western area of the site falls within a 'Low' risk area.
Groundwater	The site falls within an area with '<i>potential for groundwater flooding to occur at surface</i>' – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	

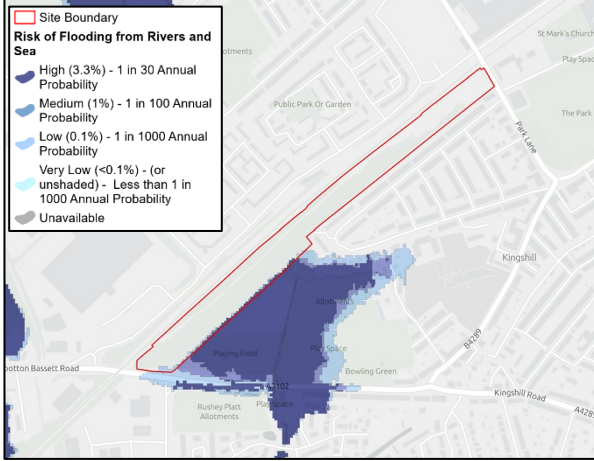
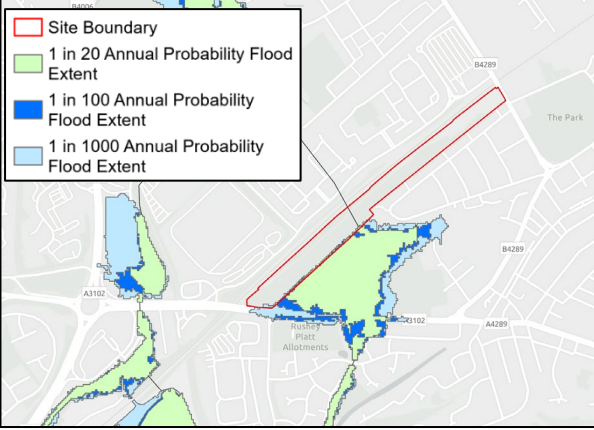
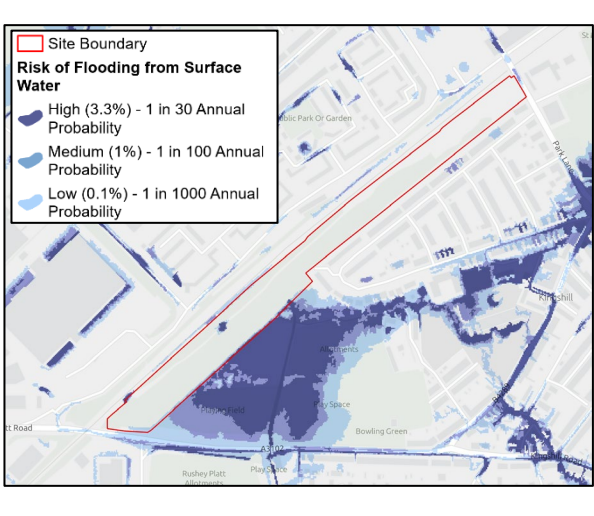
Reservoirs and other sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 ‘Risk of Flooding from Reservoirs – Maximum Flood Extent’.			
	Thames Water DG5 sewer flooding records indicates that the site lies in an area with between 0-5 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 018 ‘Thames Water DG5 Sewer Flooding Records’.			
Historic Flooding Records	The are no records of the site being impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 016 ‘EA Historic Flood Map’.			
Flood Risk – Climate Change				
Climate Change Allowances	The site lies within the ‘Gloucestershire and Vale Management Catchment’.			
	The peak river flow allowances are detailed below:			
	Management Catchment	Climate Change Allowance 2080’s epoch		
		Central	Higher	Upper
	Gloucestershire and Vale Management Catchment	+26%	+41%	+84%
	The peak rainfall allowances are detailed below:			
	Gloucestershire and the Vale Management Catchment	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)		
		Central	Upper End	
	3.3% (1 in 30-year) rainfall	+25%	+35%	
	1% (1 in 100-year) rainfall	+25%	+40%	
Modelled Flood Extents (Rivers) (Climate Change)	Site Boundary 1 in 100 Annual Probability +26% Climate Change Extent 1 in 100 Annual Probability +41% Climate Change		The modelled outputs indicate that the flood extents plus climate change (CC) have no impacts of flooding within the site. The flood extents run adjacent to the western site boundary only.	

Surface Water (incl Climate Change)		The entire site is impacted during the surface water climate change scenario, with areas of 'High' risk extent broadly consistent with present day scenario, but more extensive areas of 'Medium' risk is present in the south-western area of the map (effectively covering the remainder of the site).
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The entire site area falls outside the 1 in 100 AP plus climate change fluvial flood extent, as is the adjacent access via the car park connected to Ramleaze Drive and Pilgrim Close. Surface Water: The entire site area is located inside the 1 in 100 AP plus climate change surface water flood extent, as is the adjacent access via the car park connected to Ramleaze Drive (and Ramleave Drive). Further appraisal of this source of flooding would be required to refine the assessment of flooding, and to verify the flood depths and flood hazard on the designated routes from the site.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

	Summary of Flood Risk A summary of the flood risk to the site is provided below: • The entire site area is in Flood Zone 1 'Low Probability'; • The entire site area is located outside the EA modelled 1 in 1000 AP fluvial flood extent, allowing for climate change; • The RoFSW mapping indicates surface water flood risk impacts the entire site due to a flow route running north-west across the site, with the majority of the northern and central areas of the site located within the 'High' and 'Medium' risk areas. When climate change is considered, the whole site is within these flood risk categories; • The site is not at risk of flooding in the event of a reservoir breach; • The site falls within an area with 'potential for groundwater flooding to occur at surface'. • Thames Water DG5 sewer flooding records indicates that the site lies in an area with between 0-5 properties at risk of flooding from sewers. • There is no record of the site having been impacted by historic flood events. It is recommended that groundwater conditions are confirmed through a commitment to intrusive testing/monitoring so this can be appropriately mitigated if/where necessary. The whole site is at very low risk of flooding from fluvial sources, however the flood risk from pluvial sources impacts the site area. Therefore, further detailed assessment of this source of flooding would be required to demonstrate the site could be developed safely and in accordance with the requirements of the NPPF. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) Development is appropriate in Flood Zone 1, over the entire site area. Development in Flood Zone 2 is appropriate, subject to the Sequential Test Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	<u>Spatial Planning</u> The entire site area is in Flood Zone 1 'Low Probability'. The site borders areas located within Flood Zone 2 'Medium Probability' and Flood Zone 3a 'High Probability' beyond the western site boundary, following the Shaw Brook. A review of flood risk within the site has been carried out, and confirms the site is at 'Very Low' risk of flooding from fluvial sources, However, the site is identified on a surface water flood flow route, impacting the whole site and access to the south, which is further exacerbated due to climate change. <u>As such, the site is not currently considered feasible for development due to this key flood risk constraint.</u> Further detailed surface water modelling would need to be undertaken to refine the assessment of flood risk from this source. If this can demonstrate the available RoFSW mapping is incorrect and the site is not at risk then evidence will need to be presented in a detailed site-based Flood Risk

	Assessment (FRA) as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> Not applicable

18-034 - Newburn Sidings (SHLAA ref: s0097, Local Plan ref: SUA01)					
Grid Reference	SU1380184359		Post Code (nearest)	SN1 5ES	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises open green space, made up of wooded and grassed area between established residential development on Dean Street to the south (giving way to woodland further south-west) and the railway line to the north. The site is bordered by Wootton Bassett Road to the south-west and Park Lane to the north-east. The River Ray (EA Main River), is culverted as it flows across a central part of the site in a northerly direction (the culvert continuing for approximately 300m until it emerges near Redcliffe Street to the north).				
Topography				Ground levels at the site are relatively flat, with much of the site ranging from 99m AOD to 102m AOD.	
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)				Almost all the site is in Flood Zone 1 'Low Probability'. A minor area of the site along the southern and south western boundary is in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'.	
Flood Zone 1	96%	Flood Zone 2	1.3%	Flood Zone 3	2.7%
Flood Defences	There are no formal flood defences in the area.				

Risk of Flooding from Rivers and Sea (RoFRS)		Almost the entirety of the site is at 'Very low' risk. A minor area of the site along the southern and south western boundary is at a 'Low' to 'High' risk of flooding, which appears to be due to floodwater backing up behind on the upstream (south) side of the culvert through the site.
Modelled Flood Extents (Present Day) (Rivers)		Almost all of the site is outside all modelled extents. A minor area along the southern and south western boundary is located within the 1 in 100 AP floodplain and the 1 in 1000 AP flood extent. The local modelled 1 in 20 AP flood extent impacts a marginal area along the southern boundary.
Risk of Flooding from Surface Water (Present Day)		The majority of the site is outside all surface water extents (i.e. 'Very Low' risk), except for a minor localised area of ponding in the centre of the site at 'Low' to 'High' risk only. Flooding follows the same pattern as the fluvial mapping, with apparent backing up behind the site culvert and some very minor flooding where it encroaches into the site along the southern and south- western boundary, ranging from 'Low' to 'High' risk.
Groundwater	The eastern area of the site is primarily outside of the areas susceptible to groundwater flooding, however the western half of the site has the potential for groundwater flooding of property situated below ground level– see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other sources	The site is not at risk of reservoir flooding – see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. Thames Water DG5 sewer flooding records indicates that the majority of the site lies in an area with between 5-10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 'Thames Water DG5 Sewer Flooding Records'.	
Historic Flooding Records	The site has not been impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 017 'EA Historic Flood Map'.	

Flood Risk – Climate Change

Climate Change Allowances

The site lies within the 'Gloucestershire and Vale Management Catchment'.

The peak river flow allowances are detailed below:

Management Catchment	Climate Change Allowance 2080's epoch		
	Central	Higher	Upper
<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%

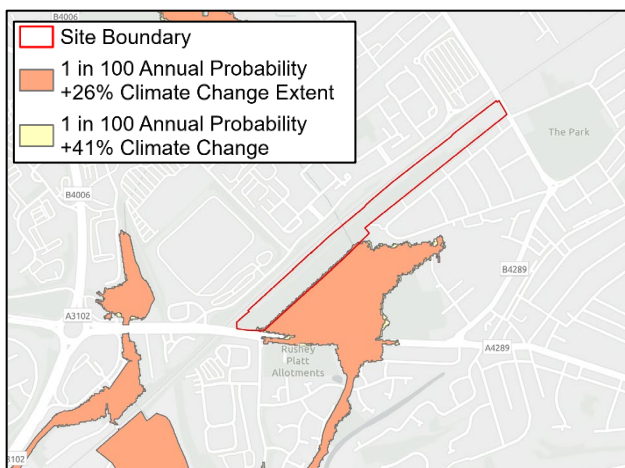
The peak rainfall allowances are detailed below:

<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)	
	Central	Upper End
3.3% (1 in 30-year) rainfall	+25%	+35%
1% (1 in 100-year) rainfall	+25%	+40%

Modelled Flood Extents

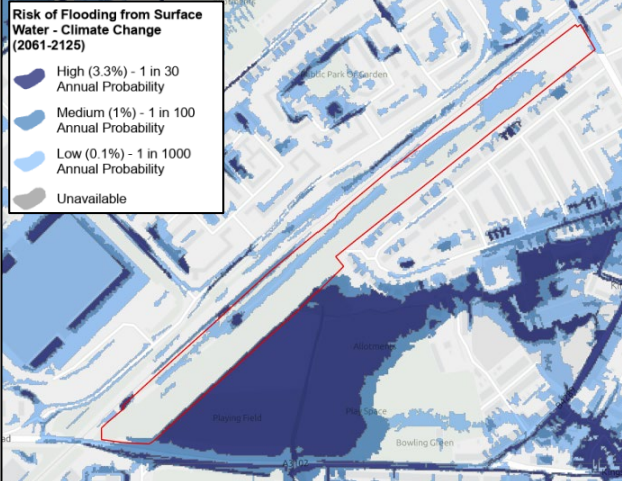
(Rivers)

(Climate Change)



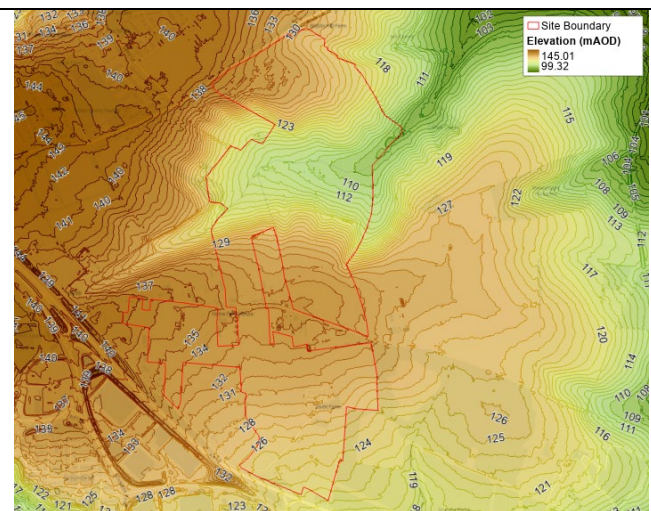
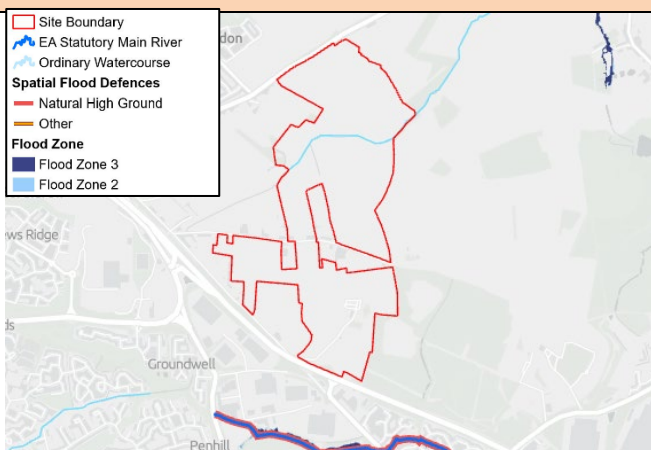
Almost the entirety of the site is outside all modelled extents.

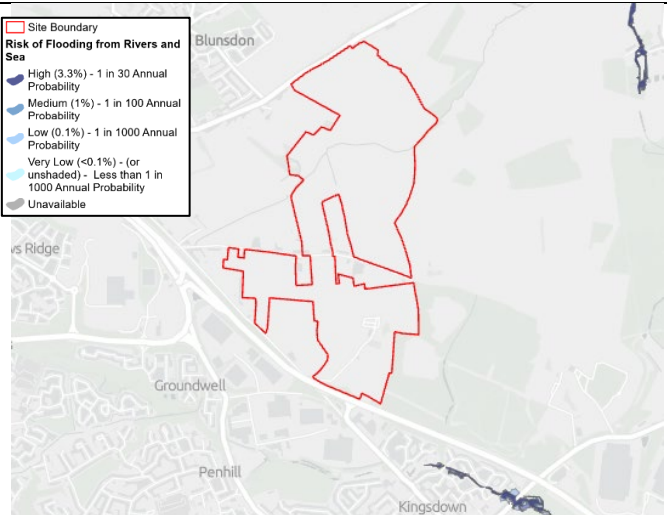
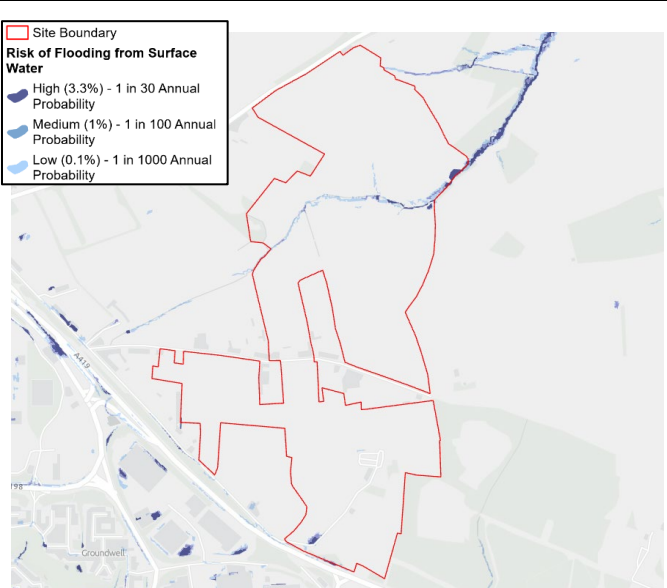
A minor area along the southern boundary is located in the 1 in 100 AP +26% (and +41%) climate change flood extent.

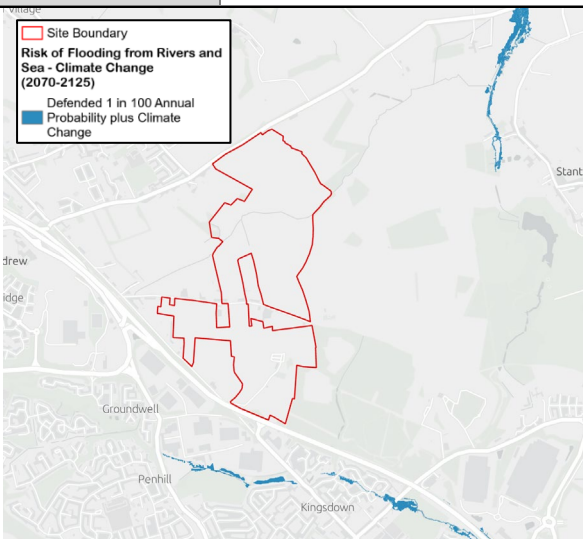
Surface Water (incl Climate Change)		Much of the area of the site is outside all risk area (and is therefore at 'Very Low' risk). There are significant areas at a 'Low' risk across the north side of the site, and a small localised area at 'High' risk in the western half of the site, all of which are isolated areas of ponding and not forming part of a wider flow route. There is significant flooding beyond the southern boundary, however this only marginally encroaches into the site.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: Almost the entirety of the site is outside the 1 in 100 AP plus climate change fluvial flood extent, as is Park Lane and Wootton Bassett Road at either ends of the site, and any links through the residential area onto Dean Street. Surface Water: Much of the site is outside the 1 in 100 AP plus climate change surface water flood extent, as are the access points. The wider access routes are impacted to varying degrees by surface water flooding and may require further consideration.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

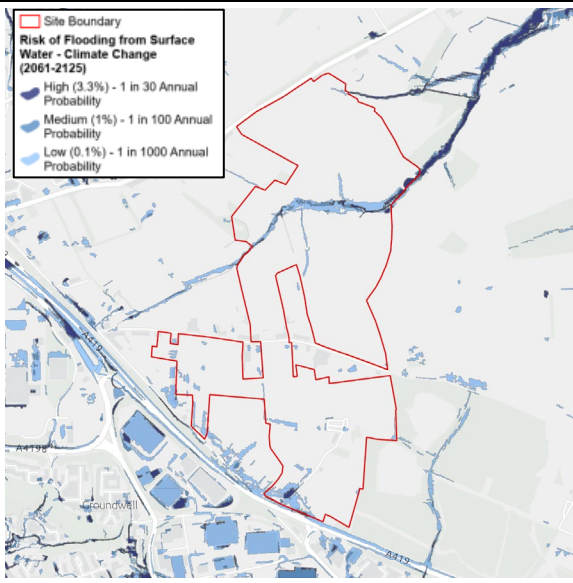
	Summary of Flood Risk A summary of the flood risk to the site is provided below: • Almost the entirety area of the site is in Flood Zone 1 'Low Probability'. A minor area of the site along the southern and south-western boundary of the site is located in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability', upstream of the culverted River Ray through the site; • The local modelled 1 in 20 AP flood extent impacts a marginal area along the southern boundary, which is also in the 'design' 1 in 100 AP +26% climate change extent; • The RoFSW mapping indicates that the majority of the site is outside all surface water extents, except for a minor localised area in the centre of the site at 'Low' to 'High' risk only. The future scenario is more extensive and indicates that there are potential surface water flood risk areas on the wider access routes to/from the site; • The site is not at risk of flooding in the event of a reservoir breach; • Most of the eastern half of the site is not located in an area susceptible to groundwater flooding. However, the western half of the site has the potential for groundwater flooding of property situated below ground level; • Thames Water DG5 sewer flooding records indicates that the site lies in an area with between 5-10 properties at risk of flooding from sewers. • There is no record of the site having been impacted by historic flood events. It is recommended that groundwater conditions are confirmed through a commitment to intrusive testing/monitoring so this can be appropriately mitigated if/where necessary. The majority of the site is at low risk of fluvial flooding. The main risk of flooding is from pluvial sources in extreme events, which is largely concentrated in the central and northern areas of the site. As such it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) Development is appropriate in Flood Zone 1, over almost the entirety of the site. Development in Flood Zone 2 is appropriate, subject to the Sequential Test Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	<u>Spatial Planning</u> Almost the entirety of the site is in Flood Zone 1 'Low Probability'. A minor area in the south and south west of the site is within Flood Zone 2 'Medium Probability' and areas of both Flood Zone 3a 'High Probability' and Flood Zone 3b 'Functional Floodplain'. A review of flood risk within the site has been carried out, and as the main source of flood risk is from pluvial sources, although this is only mainly areas at 'low' risk and they concentrated in the central and northern areas of the site. It is considered feasible to design the development such that it remains safe throughout the lifetime of the development. It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as

	an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26%, allowance for climate change, and a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; 2. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event; 3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 4. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a severe surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA; 5. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';

18-037- Kingsdown (SHLAA ref: s0108, Local Plan ref. KSD03)					
Grid Reference	SU 16143 89631		Post Code (nearest)	SN25 5DL	
Development Proposal	Residential-led mixed use		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises agricultural land north-east of the Groundwell area of Swindon. Turnpike Road partly borders the site to the south-west, running parallel to the A419. The B4019 borders the site to the north. The Bydemill Brook ordinary watercourse flows through the northern part of the site in a generally north-east direction. The Kingsdown Brook flows south-east approximately 400m to the south of the site.				
Topography			Ground levels generally fall to the north and, to a lesser degree, the south from the centre and range from 139m AOD to 107m AOD.		
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)			The site is entirely within Flood Zone 1 'Low Probability'.		
Flood Zone 1	100%	Flood Zone 2	0%	Flood Zone 3	0%
Flood Defences	There are no local flood defences at the site				

Risk of Flooding from Rivers and Sea (RoFRS)		The entire site is at 'Very Low' risk.
Modelled Flood Extents (Present Day) (Rivers)	There are no modelled flood extents for the site.	
Risk of Flooding from Surface Water (Present Day)		The site is almost all at 'Very low' flood risk from surface water (less than 1 in 1000 annual probability) There are localised areas of 'Low' to 'High' surface water flood risk corresponding to the Bydemill Brook and in a small areas of ponding adjacent to Turnpike Road.
Groundwater	The majority of the site is located within an area with limited susceptibility to groundwater flooding, however there is a small area along the Bydemill Brook with potential for groundwater flooding to occur at surface – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other sources	Parts of the site along the Bydemill Brook is at risk of reservoir flooding when river levels are normal and when there is also flooding from rivers - see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. It should be emphasised that the risk of flooding from a reservoir breach is very small. The EA is the enforcement authority for the Reservoirs Act (1975) and there is a mandatory requirement for all large, raised reservoirs to be inspected and supervised by reservoir panel engineers. Thames Water DG5 sewer flooding records indicates that the northern section of the site lies in an area with 0-5 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 'Thames Water DG5 Sewer Flooding Records'. Data is not available for the southern section of the site.	

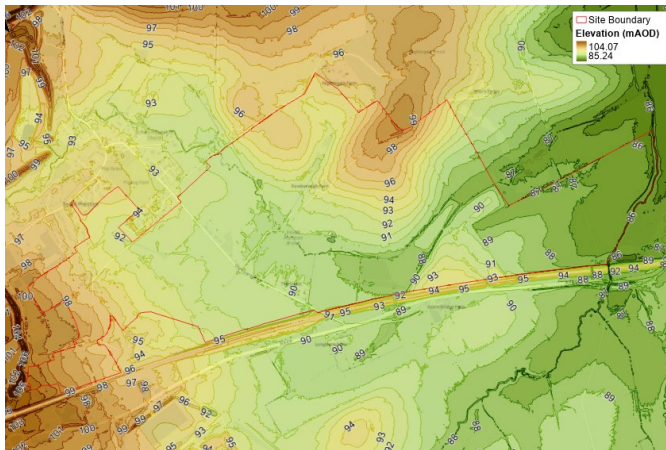
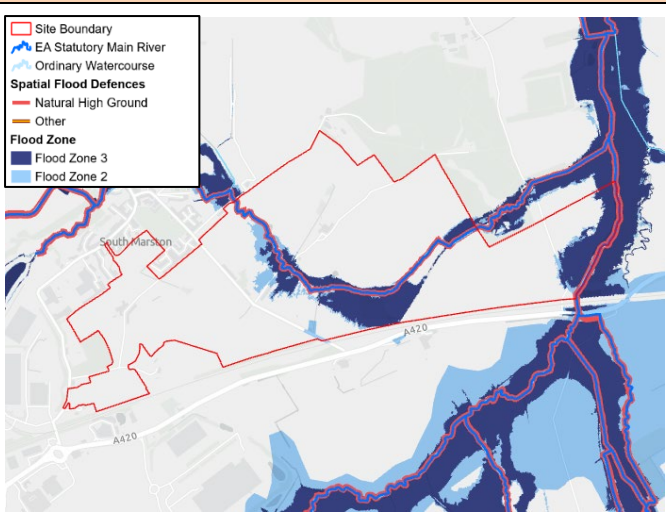
Historic Flooding Records	The site has not been impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 017 ‘EA Historic Flood Map’.			
Flood Risk – Climate Change				
Climate Change Allowances	The site lies within the ‘Gloucestershire and Vale Management Catchment’.			
	The peak river flow allowances are detailed below:			
	Management Catchment	Climate Change Allowance 2080’s epoch		
		Central	Higher	Upper
	Gloucestershire and Vale Management Catchment	+26%	+41%	+84%
Modelled Flood Extents (Rivers) (Climate Change)	The peak rainfall allowances are detailed below:			
	Gloucestershire and the Vale Management Catchment	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)		
		Central	Upper End	
	3.3% (1 in 30-year) rainfall	+25%	+35%	
	1% (1 in 100-year) rainfall	+25%	+40%	
		In the absence of modelled outputs, the RoFRS plus climate change (CC) map shows that there are no impacts of flooding within the site.		

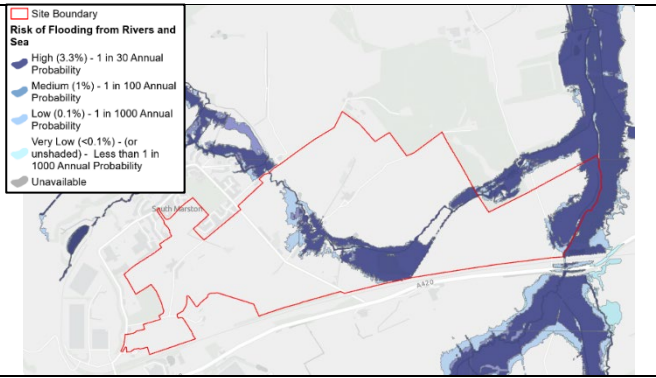
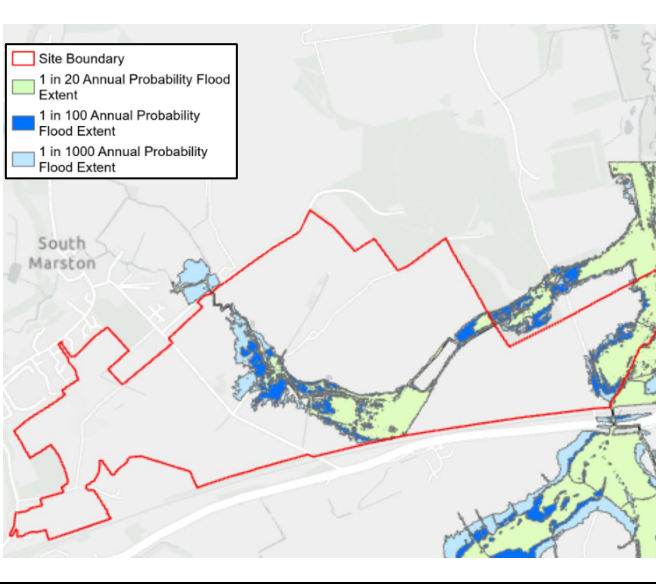
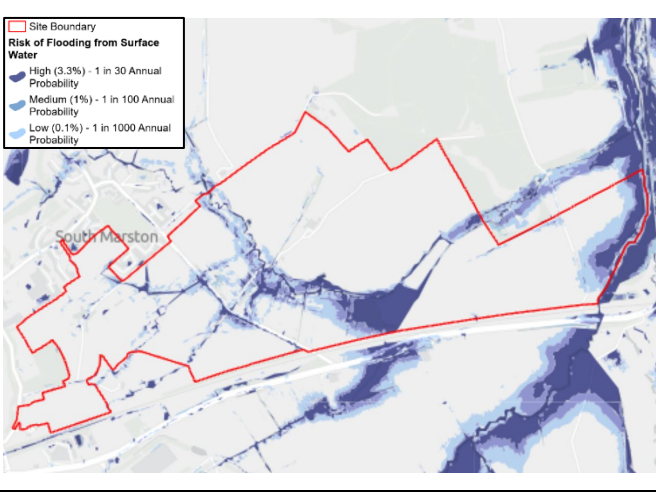
Surface Water (incl Climate Change)		The vast majority of the site remains at 'Very low' flood risk. There are areas of 'Medium' and 'High' risk corresponding to the Bydemill Brook are more concentrated but remain focussed along the route of the watercourse, while the flood risk along and adjacent to Turnpike Road in the southern part of the site identifies a greater area at 'Low' risk.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The site is outside the 1 in 100 AP plus climate change fluvial flood extent, as is the adjacent access via Turnpike Road and the B419. Surface Water: The central and southern area of the site is outside the 1 in 100 AP plus climate change surface water flood extent, while the route of the Bydemill Brook and a number of localised depressions are at risk. Access along Turnpike Road to the south is outside the 1 in 100 AP plus climate change extent, at 'Low' risk of surface water flooding, and access is also available to the site via the B4019 to the north.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

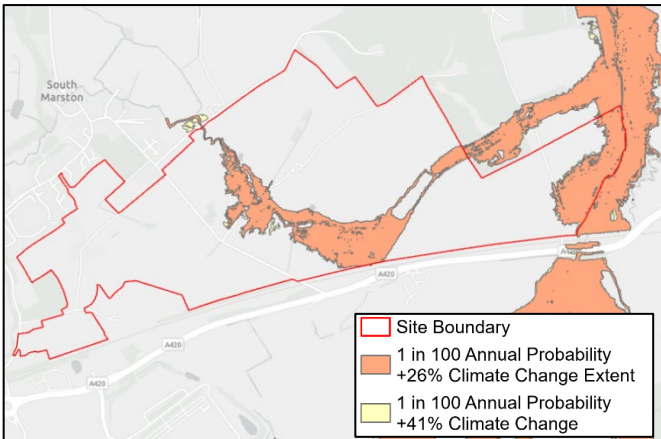
	Summary of Flood Risk A summary of the flood risk to the site is provided below: • The whole site is in Flood Zone 1 'Low Probability' and located outside the 'design' 1 in 100 AP +26% climate change extent; • The RoFSW mapping indicates the site is primarily at 'Very Low' risk, with surface water flood risk concentrated along the route of the Bydemill Brook. There is 'Low' surface water flood risk along parts of Turnpike Road to the south-west but other access routes remain unaffected. • The Bydemill Brook is at risk of flooding in the event of a reservoir breach; • The majority of the site is located within an area with limited susceptibility to groundwater flooding, however there is a small area along the Bydemill Brook with potential for groundwater flooding to occur at surface. • Thames Water DG5 sewer flooding records indicates that the site lies in an area with 0-5 properties at risk of flooding from sewers. • There is no record of the site having been impacted by historic flood events. The L1 SFRA confirmed that ground water flood risk is low across the Borough. However, it is recommended that groundwater conditions are confirmed through a commitment to intrusive testing/monitoring so this can be appropriately mitigated if/where necessary. The northern and southern areas of the site are at low risk from all sources of flooding, with flood risk from fluvial and pluvial sources largely concentrated along the Bydemill Brook watercourse in the central area of the site. As such it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) Development is appropriate in Flood Zone 1, across the entire site. Development in Flood Zone 2 is appropriate, subject to the Sequential Test Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	<u>Spatial Planning</u> The site is in Flood Zone 1 'Low Probability'. A review of flood risk within the site has been carried out and, as the surface water risk of flooding is largely confined to the route of the Bydemill Brook, it is considered feasible to design the development around it, such that it remains safe throughout the lifetime of the development. It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.

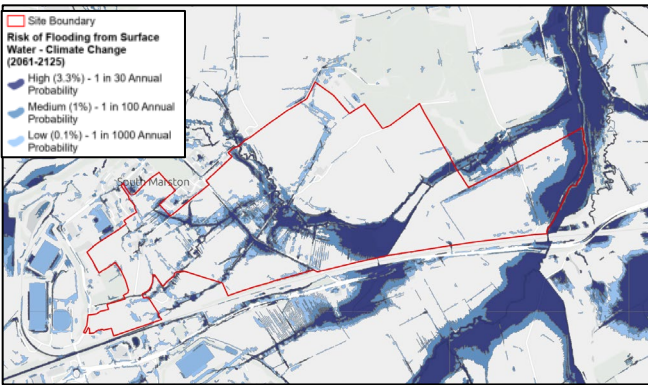
Design Recommendations

1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26%, allowance for climate change, and a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event;
2. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event;
3. Detailed modelling of the Bydemill Brook is recommended to verify the flood risk from this source, unless the identified floodplain (RoFSW mapping) can be avoided along with a significant buffer to development on either side;
4. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements;
5. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a severe surface water flood event, the wider local road network may be impacted by surface water flooding and this should be considered further in the FRA;
6. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability'.

18-039 – South Marston and Rowbridge (SHLAA ref: s0565, Local Plan ref: NEV04)					
Grid Reference	SU 20315 87593		Post Code (nearest)	SN3 4SU	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises agricultural land, bordered by a railway line to the south, south of which lies the A420. Old Vicarage Lane runs north-west through the centre of the site and the south-west corner abuts Thornhill Road. The South Marston Brook (Main River) flows through the site, entering from the north-west and turning within the site to flow north-east out of the site. The River Cole (Main River) denotes the eastern boundary of the site, flowing north.				
Topography			Ground levels fall from high points in the north and west, to the south and towards the river valley in the east. Ground levels range from 103m AOD to 86m AOD.		
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)			The eastern boundary and central area along the route of the South Marston Brook are in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability', effectively splitting the site into three main parcels of land in Flood Zone 1 'Low Probability'.		
Flood Zone 1	87%	Flood Zone 2	2%	Flood Zone 3	11%
Flood Defences	Flood defences in the area are identified as 'natural high ground' along the banks of the South Marston Brook and the River Cole.				

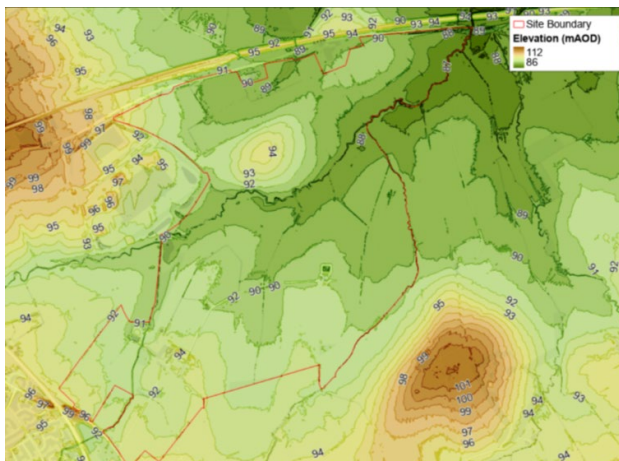
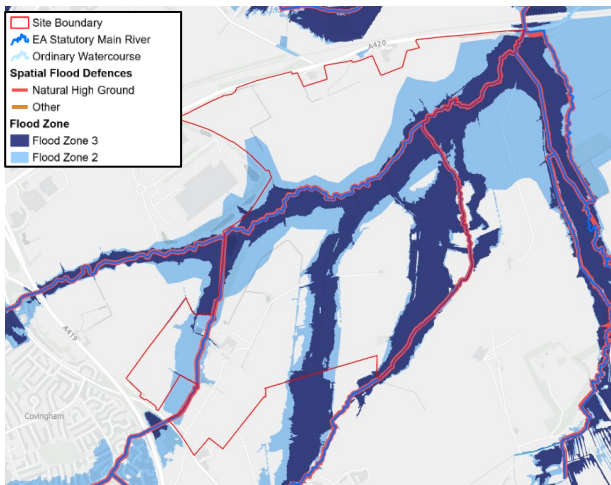
Risk of Flooding from Rivers and Sea (RoFRS)		The main site area is at 'Very Low' risk. Areas at 'High' risk follow the route of the South Marston Brook through the centre of the site, and along the River Cole to the east.
Modelled Flood Extents (Present Day) (Rivers)		The main site area is outside all modelled extents. The river corridors along the South Marston Brook are located within the 1 in 100 and 1 in 1000 AP flood extents. The local modelled 1 in 20 AP flood extent impacts the central and eastern areas along the route of the watercourses.
Risk of Flooding from Surface Water (Present Day)		The majority of the site is at 'Very Low' risk). Flooding is largely concentrated along the South Marston Brook and River Cole corridors, where there are significant areas ranging from 'Low' to 'High'. There are also narrow flow corridors of 'Low' to 'High' flood risk in the western part of the site draining towards the South Marston Brook.
Groundwater	The site is located within an area with potential for groundwater flooding to occur at surface – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'. Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 'Thames Water DG5 Sewer Flooding Records'.	

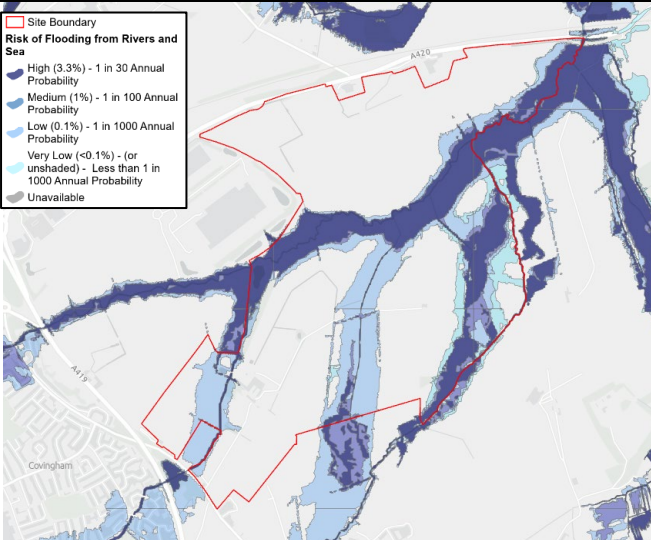
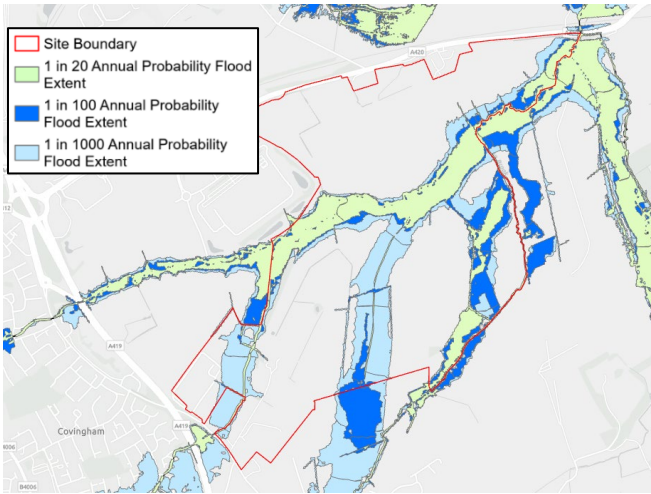
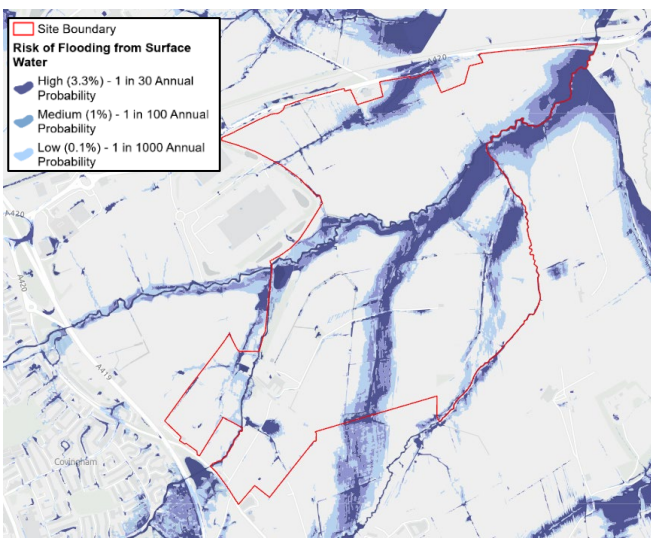
Historic Flooding Records	A small area in the south of the site along Old Vicarage Lane was impacted during the July 2007 flood, based on available EA and SBC records – see Level 1 SFRA – Figure 017 ‘EA Historic Flood Map’.			
Flood Risk – Climate Change				
Climate Change Allowances	The site lies within the ‘Gloucestershire and Vale Management Catchment’.			
	The peak river flow allowances are detailed below:			
	Management Catchment	Climate Change Allowance 2080’s epoch		
		Central	Higher	Upper
	Gloucestershire and Vale Management Catchment	+26%	+41%	+84%
Modelled Flood Extents	The peak rainfall allowances are detailed below:			
	Gloucestershire and the Vale Management Catchment	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)		
		Central	Upper End	
	3.3% (1 in 30-year) rainfall	+25%	+35%	
	1% (1 in 100-year) rainfall	+25%	+40%	
(Rivers)				
(Climate Change)	The northern, western and eastern areas are outside all modelled extents.			
	The central and eastern areas of river corridor are located in the 1 in 100 AP +26% (and +41%) climate change flood extent.			

Surface Water (incl Climate Change)		The north-eastern and eastern areas of the site are at low risk (i.e. 'Very Low'), except for minor localised areas representing topographic low points and channels. Flooding is largely concentrated in the central area, where there are significant areas ranging from 'Low' to 'High', while the flow routes across the western part of the site are intensified from the present day scenario.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The northern and western area of the site are outside the 1 in 100 AP plus climate change fluvial flood extent, as is the adjacent access via Old Vicarage Road. The eastern site area is potentially isolated by the surrounding floodplain and would require new crossings within the site for safe access. Surface Water: The northern and eastern areas of the site are outside the 1 in 100 AP plus climate change surface water flood extent. There is a large area of surface water flood risk around the South Marston Brook floodplain, and the adjacent access via Old Vicarage Road is similarly impacted by surface water flooding within the 'High' risk scenario and is likely to require further consideration.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

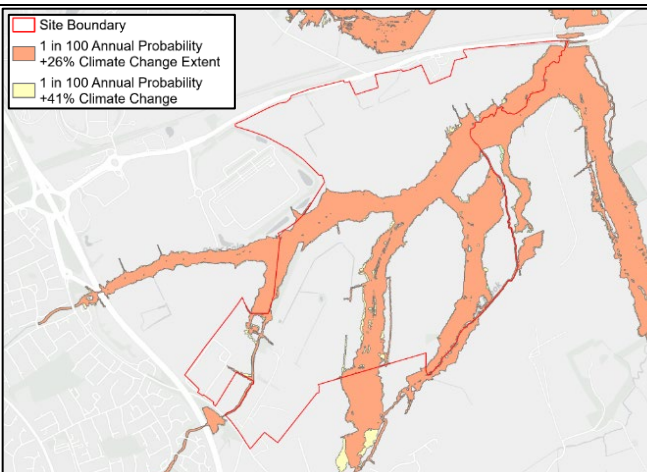
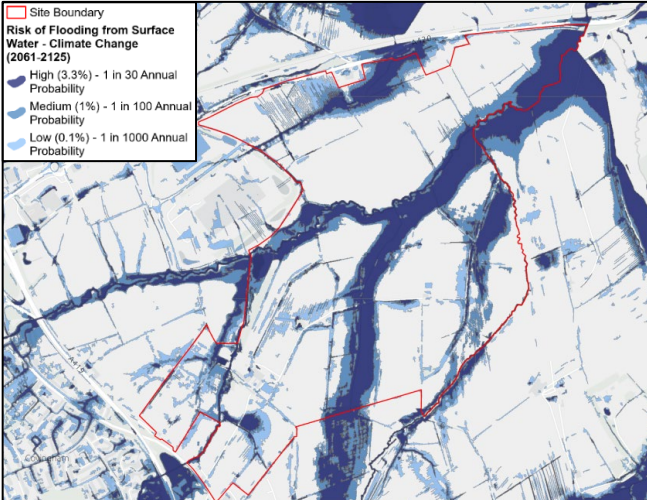
	Summary of Flood Risk A summary of the flood risk to the site is provided below: • The northern, eastern and western parts of the site are in Flood Zone 1 'Low Probability', whereas the central area and eastern boundary along river corridors are located in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'; • The detailed modelling and RoFRS mapping indicates that some of these river corridors through the site lie in Flood Zone 3b 'Functional Floodplain'; • The central area of the site and eastern boundary are located in the 'design' 1 in 100 AP +26% and +41% climate change extent. • The RoFSW mapping indicates surface water flood risk is concentrated in the central area and eastern boundary of the site, with some smaller flow routes across the western area. The majority of the northern and eastern area of the site is not at risk of surface water flooding beyond isolated areas. There is also surface water flood risk on the wider access routes to/from the site. • The site is not at risk of flooding in the event of a reservoir breach; • The site is located in an area susceptible to groundwater flooding. • Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers. • There is a record of part of the site having been impacted by historic flood events. The L1 SFRA confirmed that ground water flood risk is low across the Borough. However, it is recommended that groundwater conditions are confirmed through a commitment to intrusive testing/monitoring so this can be appropriately mitigated if/where necessary. The three main areas of the site are at low risk of flooding, with flood risk from fluvial and pluvial sources largely concentrated in the central and eastern areas of the site. As such it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) Development is appropriate in Flood Zone 1, over the western, northern and eastern parts of the site. Development in Flood Zone 2 is appropriate, subject to the Sequential Test Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	Spatial Planning The majority of the site is in Flood Zone 1 'Low Probability'. The central area and eastern boundary is within Flood Zone 2 'Medium Probability' with areas of both Flood Zone 3a 'High Probability' and Flood Zone 3b 'Functional Floodplain' of the South Marston Brook and River Cole respectively. If development is proposed within Flood Zone 3 then further detailed modelling would be required to verify the extent of the 1 in 30 AP Flood Zone 3b Functional Floodplain' (since the current extent is based on the 1 in 20 AP modelled flood extent, or the national scale RoFRS mapping only). A review of flood risk within the site has been carried out, and as the risk of flooding is largely concentrated in the river corridors through the central and eastern areas of the site it is considered

	feasible to design the development within the Flood Zone 1 areas, such that it remains safe throughout the lifetime of the development. The southern access via Old Vicarage Road is within the 1 in 30 AP surface water flood extent and so will also require consideration. It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26% allowance for climate change flood level, and a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; 2. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event; 3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 4. Safe access to the majority of the site is available in the current 1 in 100 AP plus climate change fluvial flood event (the wider accessibility to the eastern parcel requires further appraisal. In a severe surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA; 5. Crossing of watercourses may be required to facilitate access to parcels of developable and over the site (particularly into the eastern parcel of land). Where so, these should be in accordance with EA and LLFA requirements – i.e. open span structures set above reference flood levels; 6. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';

18-040 – Great Stall East and Lotmead (SHLAA ref: s0373, Local Plan ref: NEV05)					
Grid Reference	SU2058486434		Post Code (nearest)	SN3 5DL	
Development Proposal	Residential-led mixed use		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises agricultural land, with new development in the south-western area. The A420 borders the site to the north, while the south-west corner abuts the Wanborough Road, close to the A419. The River Cole (EA Main River) flows east through the centre of the site. The Liden Brook (Main River) flows north along the eastern site boundary to the River Cole. The Dorcan Stream (Main River) flows north along part of the western border of the site before joining the River Cole. The Earls court Brook (Main River) flows north beyond the site to the east, before joining the River Cole at the north-eastern corner of the site. The Lenta Brook (Main River) flows just to the east of the Earls court Brook and similarly joins the River Cole at the north-eastern corner of the site.				
Topography			Ground levels generally fall from south-west to north-east and range from 97m AOD to 86m AOD.		
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)			The significant areas of the site in the north, south-east and south-west lie in Flood Zone 1 'Low Probability'. These are separated by areas of Flood Zone 2 and 3 along the River Cole (east-west) and along the route of watercourses flowing north through the site area (including an unnamed ordinary watercourse flowing north through the centre of the site).		
Flood Zone 1	58.0%	Flood Zone 2	19.0%	Flood Zone 3	23.0%

Flood Defences	'Natural high ground' is identified along the banks of the River Cole, Liden Brook, Dorcan Stream, Earls court Brook and Lenta Brook.	
Risk of Flooding from Rivers and Sea (RoFRS)		The areas of the site in the north, south-east and south-west of the site are at 'Very low' risk. The land following the route of the local watercourses – including the River Cole and tributaries to the south – are denoted by the areas of increased 'Low' to 'High' risk of flooding.
Modelled Flood Extents (Present Day) (Rivers)		The northern and south-western areas of the site are outside all modelled extents. The modelled 1 in 20 AP flood extent is most notable beyond the river channel on the River Cole through the centre of the site, and to a lesser degree on the Liden Brook (eastern part of site). Flooding over the site for the other watercourses is primary at the 1 in 100 AP or 1 in 1000 AP scenarios.
Risk of Flooding from Surface Water (Present Day)		The majority of the site area outside the river corridors is at 'Very Low' risk. There are large areas of surface water flood risk along the floodplains of the local watercourses ranging from 'Low' to 'High'. Otherwise, there is a concentration of 'High' risk near Longleaze Farm on the northern end of the site, plus narrow areas of risk throughout the site correlating to land drainage channels.
Groundwater	Areas in the east of the site and areas along the river corridor are identified as having 'potential for groundwater flooding to occur at the surface' around the River Cole, Liden Brook and Dorcan Stream – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	

Reservoirs and other sources	The areas of the site along the river corridor and adjacent floodplain are at risk of flooding when river levels are normal and when there is also flooding from rivers - see Level 1 SFRA – Figure 011 ‘ Risk of Flooding from Reservoirs – Maximum Flood Extent’. It should be emphasised that the risk of flooding from a reservoir breach is very small. The EA is the enforcement authority for the Reservoirs Act (1975) and there is a mandatory requirement for all large, raised reservoirs to be inspected and supervised by reservoir panel engineers. Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 ‘Thames Water DG5 Sewer Flooding Records’.														
Historic Flooding Records	Parts of the site have been impacted by historic flood events along the route of the River Cole, based on available EA and SBC records – see Level 1 SFRA – Figure 017 ‘EA Historic Flood Map’.														
Flood Risk – Climate Change															
Climate Change Allowances	The site lies within the ‘Gloucestershire and Vale Management Catchment’. The peak river flow allowances are detailed below: <table><tr><th rowspan="2">Management Catchment</th><th colspan="3">Climate Change Allowance 2080’s epoch</th></tr><tr><th>Central</th><th>Higher</th><th>Upper</th></tr><tr><td><i>Gloucestershire and Vale Management Catchment</i></td><td>+26%</td><td>+41%</td><td>+84%</td></tr></table>	Management Catchment	Climate Change Allowance 2080’s epoch			Central	Higher	Upper	<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%			
	Management Catchment		Climate Change Allowance 2080’s epoch												
		Central	Higher	Upper											
	<i>Gloucestershire and Vale Management Catchment</i>	+26%	+41%	+84%											
	The peak rainfall allowances are detailed below: <table><tr><th rowspan="2"><i>Gloucestershire and the Vale Management Catchment</i></th><th colspan="2">Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)</th></tr><tr><th>Central</th><th>Upper End</th></tr><tr><td>3.3% (1 in 30-year) rainfall</td><td>+25%</td><td>+35%</td></tr><tr><td>1% (1 in 100-year) rainfall</td><td>+25%</td><td>+40%</td></tr></table>				<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)		Central	Upper End	3.3% (1 in 30-year) rainfall	+25%	+35%	1% (1 in 100-year) rainfall	+25%	+40%
	<i>Gloucestershire and the Vale Management Catchment</i>	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)													
Central		Upper End													
3.3% (1 in 30-year) rainfall	+25%	+35%													
1% (1 in 100-year) rainfall	+25%	+40%													

Modelled Flood Extents (Rivers) (Climate Change)		The northern and south-western/south-eastern areas are outside all modelled extents. Large parts of the central, southern, eastern and western areas are located in the 1 in 100 AP +26% (and +41%) climate change flood extent associated with the local watercourses.
Surface Water (incl Climate Change)		Areas of 'High' risk are more concentrated along the river corridors through the site, and more pronounced around the area on the northern site boundary, than the present day equivalent. The flooding along local land drainage channels, and isolated areas of ponding within the open space, is also more notable.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The northern area of the site is outside the 1 in 100 AP plus climate change fluvial flood extent, as is the adjacent access via the A420. Access is also available from the south via the Wanborough Road. Surface Water: The northern and south-western/south-eastern areas of the site beyond the river corridors are largely outside the 1 in 100 AP plus climate change surface water flood extent. Access via adjacent road network appears to be viable but would require further assessment of local impacts.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA.		

The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.

Summary of Flood Risk

A summary of the flood risk to the site is provided below:

- The north, south-west and south-east areas of the site are in Flood Zone 1 'Low Probability'. These are separated by corridors of Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability' associated with the routes of the River Cole, Liden Brook and other lesser watercourses;
- The detailed modelling indicates that some central areas of the site along the river corridors lie in Flood Zone 3b 'Functional Floodplain';
- The central, eastern, western and southern areas of the site are located in the 'design' 1 in 100 AP +26% climate change extent;
- The RoFSW mapping indicates surface water flood risk is concentrated in the central area of the site along the river corridors. The northern area of the site is not at risk of surface water flooding, beyond isolated areas. The future scenario is more extensive, however access via adjacent road network appears to be viable but would require further assessment of local impacts .
- The areas of the site along the river corridors and in the adjacent floodplain are at risk of flooding in the event of a reservoir breach;
- Areas in the east of the site and areas along the river corridor are identified as susceptible to groundwater flooding at the surface;
- Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers.
- There is a record of part of the site having been impacted by historic flood events, most recently in July 2007.

The L1 SFRA confirmed that ground water flood risk is low across the Borough. However, it is recommended that groundwater conditions are confirmed through a commitment to intrusive testing/monitoring so this can be appropriately mitigated if/where necessary.

While significant parts of the site are at low risk, there are large areas that are at risk from both fluvial and pluvial sources along the river corridors. These sources of flood risk would have to be carefully considered before the site can be developed safely, and in accordance with the requirements of the NPPF to mitigate the potential risks of these sources of flooding.

It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.

Implications for New Development

Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development)

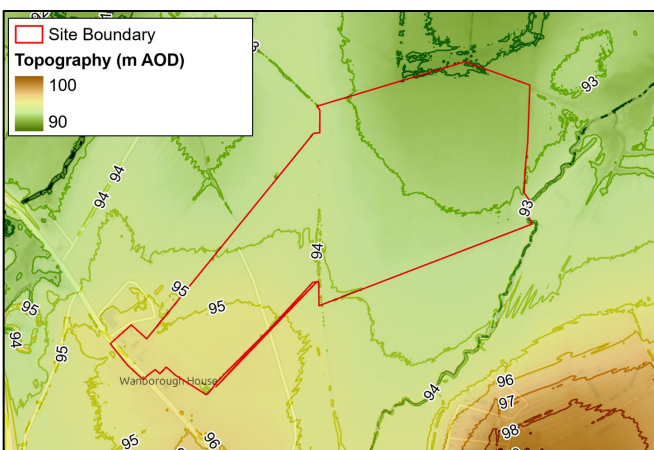
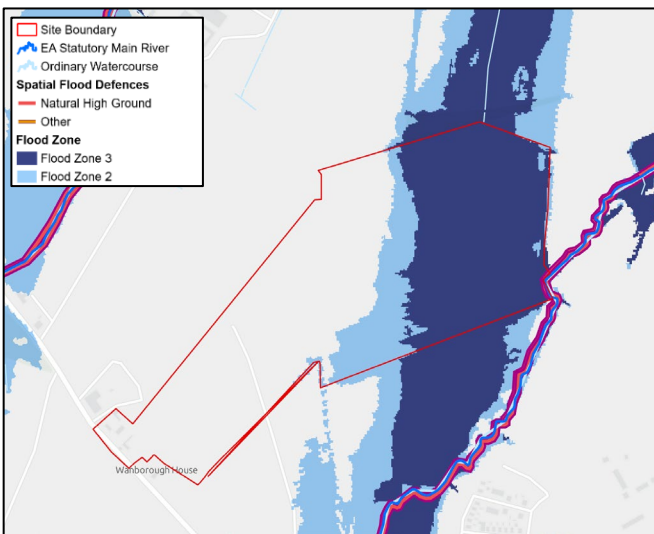
Development is appropriate in Flood Zone 1, over the northern part of the site.

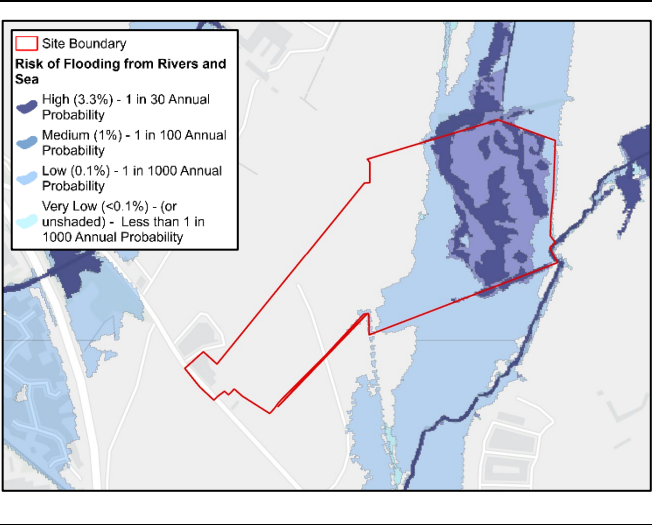
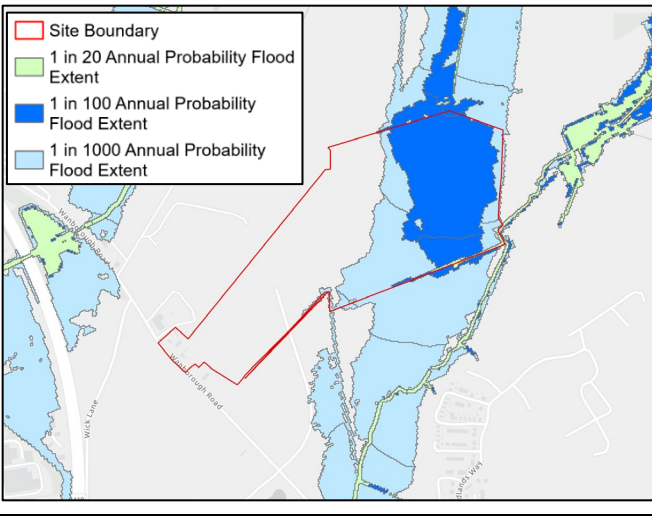
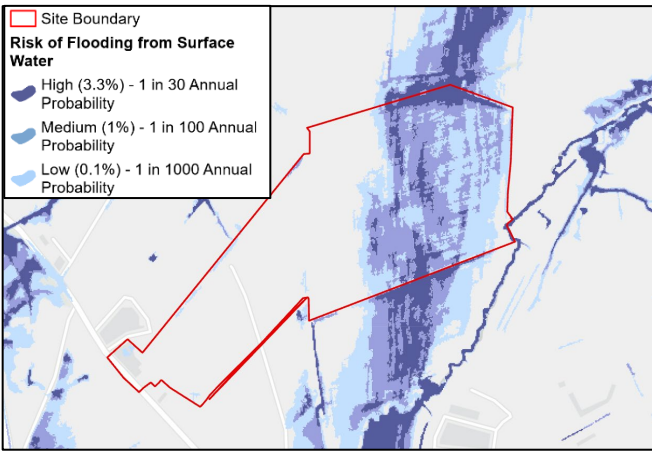
Development in Flood Zone 2 is appropriate, subject to the Sequential Test

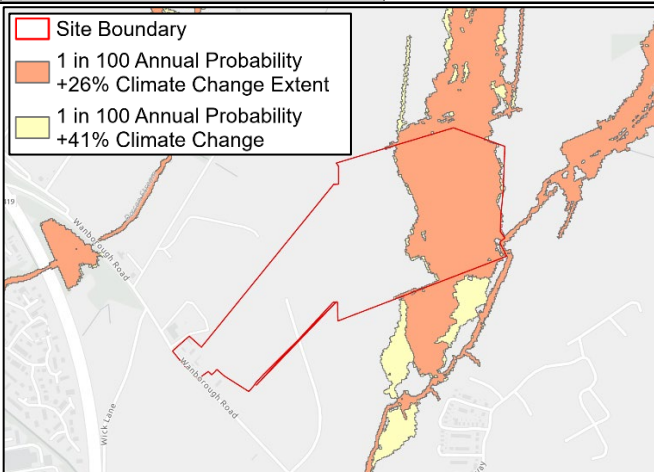
Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test

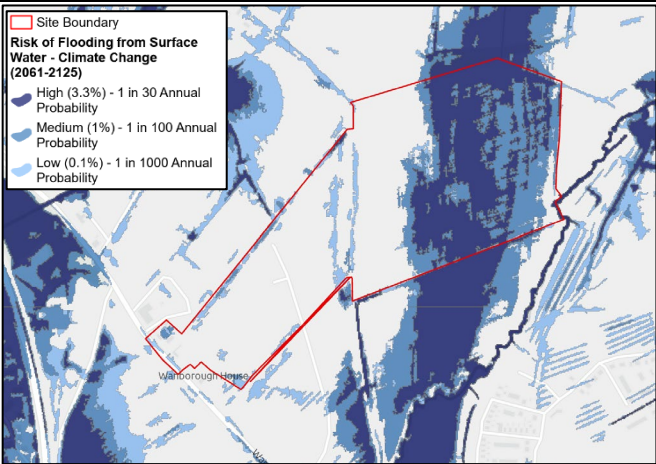
Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.

Planning Recommendations	<u>Spatial Planning</u> The north, south-west and south-east areas of the site are in Flood Zone 1 'Low Probability'. These are separated by corridors of Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability' associated with the routes of the River Cole, Liden Brook and other lesser watercourses. If development is proposed within Flood Zone 3 then further detailed modelling would be required to verify the extent of the 1 in 30 AP Flood Zone 3b Functional Floodplain' (since the current extent is based on the modelled 1 in 20 AP only). A review of flood risk within the site has been carried out. Careful consideration should be given to the large areas within Flood Zones 2, 3 and 3b associated with the River Cole and Liden Brook, and the additional risk from the Dorcan Stream, Earlcourt Stream and Lenta Brook; in addition, there are significant areas at risk of surface water flooding. Any development should be designed such that it remains safe throughout its lifetime. It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26%, allowance for climate change, and a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; 2. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event; 3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 4. Crossing of watercourses may be required to facilitate access to parcels of developable and over the site. Where so, these should be in accordance with EA and LLFA requirements – i.e. open span structures set above reference flood levels; 5. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a severe surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA; 6. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';

18-041- Green Land (SHLAA ref: s0439)					
Grid Reference	SU 20158 85258		Post Code (nearest)	SN4 0JP	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises fields, with Pauls Drive running through the site to provide access to the adjacent residential development. The Liden Brook (Main River), borders part of the eastern boundary of the site and flows in a north-easterly direction. An ordinary watercourse flows from the north-eastern corner of the site, in a north easterly direction.				
Topography			The site falls from south-west to north-east. The topography ranges from approximately 92m AOD to 95m AOD.		
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)			The central and western areas of the site are in Flood Zone 1 'Low Probability'. The eastern area of the site is located within Flood Zone 2 'Medium Probability', and Flood Zone 3 'High Probability' associated with the Liden Brook and an unnamed ordinary watercourse.		
Flood Zone 1	51%	Flood Zone 2	12%	Flood Zone 3	37%
Flood Defences	There are no formal flood defences in the area, however the site benefits from natural high ground along the Liden Brook channel.				

Risk of Flooding from Rivers and Sea (RoFRS)		The central and western areas are at 'Very low' risk from fluvial (river) sources. The eastern area is at a 'Low' to 'High' risk of flooding. In the absence of equivalent modelled outputs, the RoFRS 1 in 30 annual probability (AP) extent indicates the eastern part of the site is in Flood Zone 3b 'Functional Floodplain'.
Modelled Flood Extents (Present Day) (Rivers)		The central and western areas are outside all modelled extents. The eastern area is located within the 1 in 100 AP floodplain and the 1 in 1000 AP flood extent. The local modelled 1 in 20 AP flood extent impacts the south-eastern corner only as it borders the Liden Brook.
Risk of Flooding from Surface Water (Present Day)		The central and western areas are outside all surface water extents (i.e. 'Very Low' risk), except for minor localised areas in the centre of the site at 'Low' risk only. Flooding is largely concentrated in the eastern area, where there are significant areas ranging from 'Low' to 'High'.
Groundwater	The site is outside of any areas susceptible to groundwater flooding – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	
Reservoirs and other artificial sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 'Risk of Flooding from Reservoirs – Maximum Flood Extent'.	

	Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 ‘Thames Water DG5 Sewer Flooding Records’.			
Historic Flooding Records	The site has not been impacted by recorded historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 017 ‘EA Historic Flood Map’.			
Flood Risk – Climate Change				
Climate Change Allowances	The site lies within the ‘Gloucestershire and Vale Management Catchment’.			
	The 2080s ‘Central’ peak river flow allowance is applicable for ‘More Vulnerable’ uses.			
	Gloucestershire and the Vale Management Catchment	Peak River Flow - Climate Change Allowance (2080s epoch – 2070 to 2125)		
		Central	Higher	Upper
		+26%	+41%	+84%
The 2080s ‘Upper End’ peak rainfall allowances are applicable for surface water drainage design in ‘More Vulnerable’ uses.				
	Gloucestershire and the Vale Management Catchment	Peak Rainfall – Climate Change Allowances (2070s epoch – i.e. 2061 to 2125)		
		Central	Upper End	
	3.3% (1 in 30-year) rainfall	+25%	+35%	
	1% (1 in 100-year) rainfall	+25%	+40%	
Modelled Flood Extents (Rivers) (Climate Change)	Site Boundary 1 in 100 Annual Probability +26% Climate Change Extent 1 in 100 Annual Probability +41% Climate Change 			
	The central and western areas are outside all modelled extents. The eastern area is located in the 1 in 100 AP +26% (and +41%) climate change flood extent.			

Surface Water (incl Climate Change)		The central and western areas are outside all modelled extents (i.e. 'Very Low' risk), except for small areas in the centre and west of the site at 'Low' to 'Medium' risk. Flooding is largely concentrated in the eastern area, where there are significant areas ranging from 'Low' to 'High'.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The central and western areas of the site are outside the 1 in 100 AP plus climate change fluvial flood extent, as is the adjacent access via Wanborough Road. Surface Water: The central and western areas of the site are outside the 1 in 100 AP plus climate change surface water flood extent. The adjacent access via Wanborough Road is impacted by surface water flooding and may require further consideration.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

Summary of Flood Risk

A summary of the flood risk to the site is provided below:

- The central and western areas of the site are in Flood Zone 1 'Low Probability', whereas the eastern part of the site is located in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability';
- The RoFRS mapping indicates that some eastern areas of the site lie in Flood Zone 3b 'Functional Floodplain'. This would be superseded by detailed modelling of the 1 in 30 AP flood;
- The eastern area of the site is located in the 'design' 1 in 100 AP +26% climate change extent;
- The RoFSW mapping indicates surface water flood risk is concentrated in the eastern area of the site. The majority of the western area of the site is not at risk of surface water flooding, beyond isolated areas. The future scenario is more extensive and indicates that there are potential surface water flood risk areas on the wider access routes to/from the site;
- The site is not at risk of flooding in the event of a reservoir breach;
- The site is not located in an area susceptible to groundwater flooding.
- Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers.
- There is no record of the site having been impacted by historic flood events.

The central and western areas of the site is at low risk from all sources of flooding, with flood risk from fluvial and pluvial sources largely concentrated in the eastern area of the site. As such it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding.

It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.

Implications for New Development

Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development)

- Development is appropriate in Flood Zone 1, over the central and western part of the site;
- Development in Flood Zone 2 is appropriate, on the basis the site passes the Sequential Test;
- Development in Flood Zone 3a is appropriate, subject to the Exception Test and on the basis the site passes the Sequential Test;
- Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.

Planning Recommendations

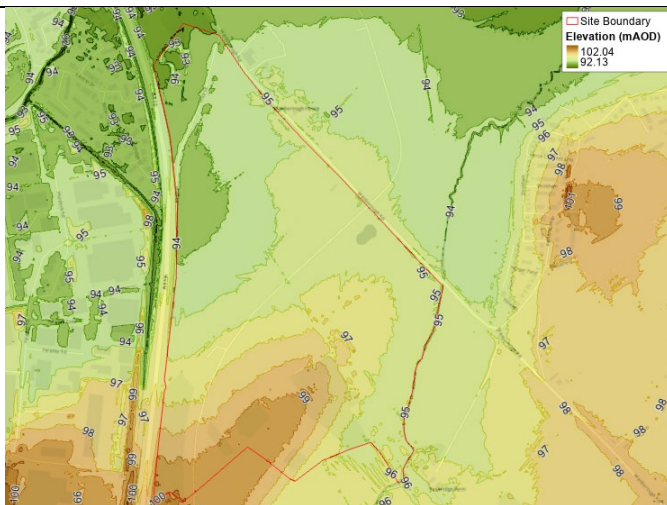
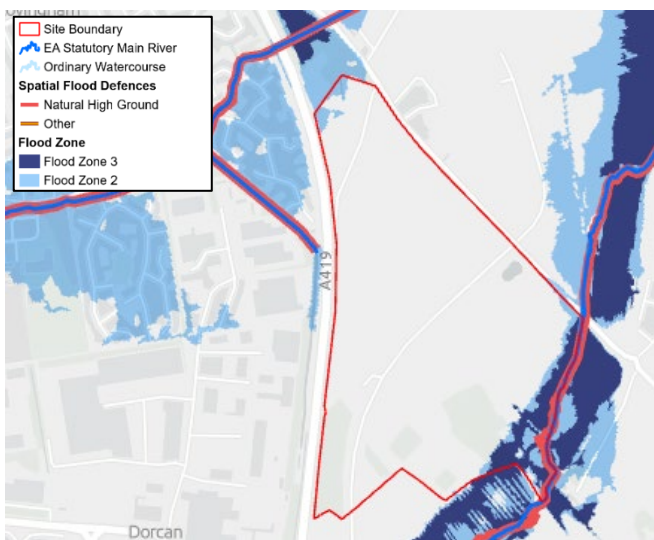
Spatial Planning

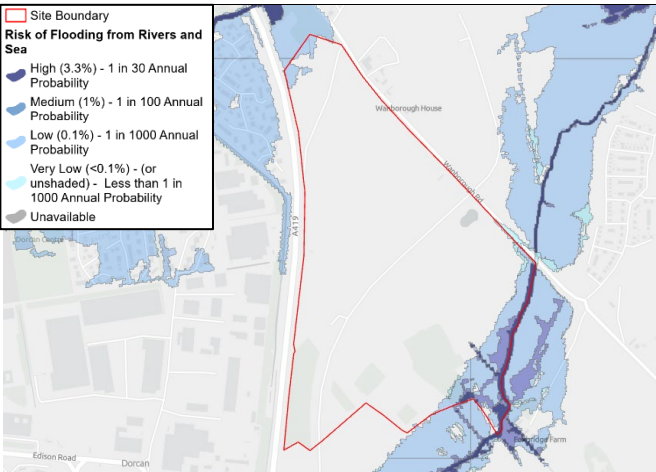
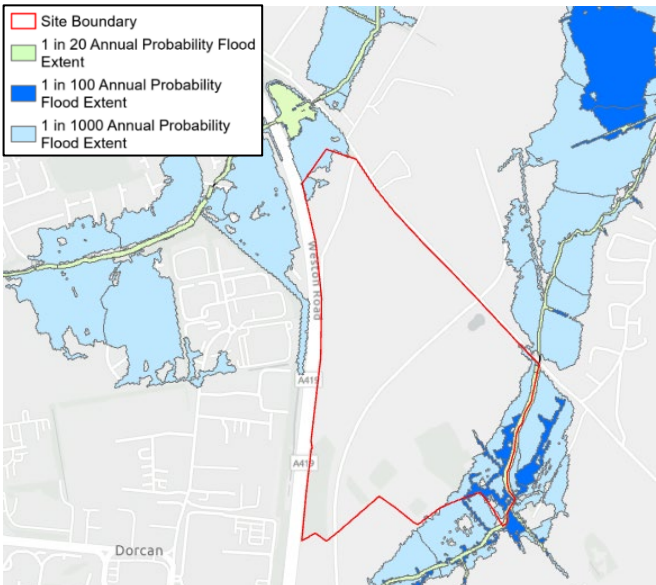
The central and western areas of the site are in Flood Zone 1 'Low Probability'. The eastern area is within Flood Zone 2 'Medium Probability' and areas of both Flood Zone 3a 'High Probability' and Flood Zone 3b 'Functional Floodplain' of the Liden Brook and an unnamed ordinary watercourse.

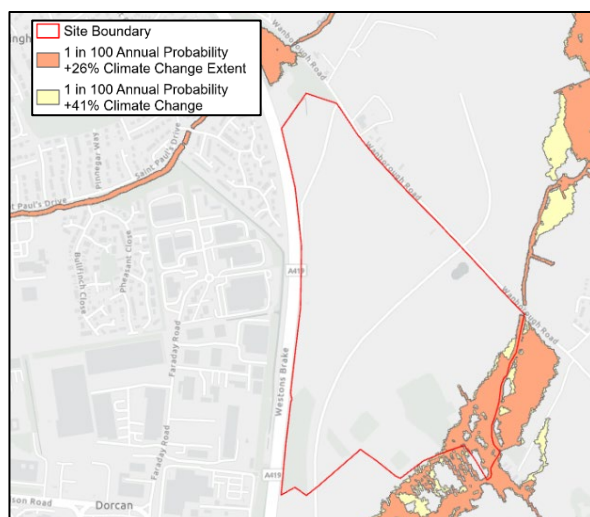
A review of flood risk within the site has been carried out, and as the risk of flooding is largely concentrated in the eastern area of the site it is considered feasible to design the development within the western and central areas, such that it remains safe throughout the lifetime of the development.

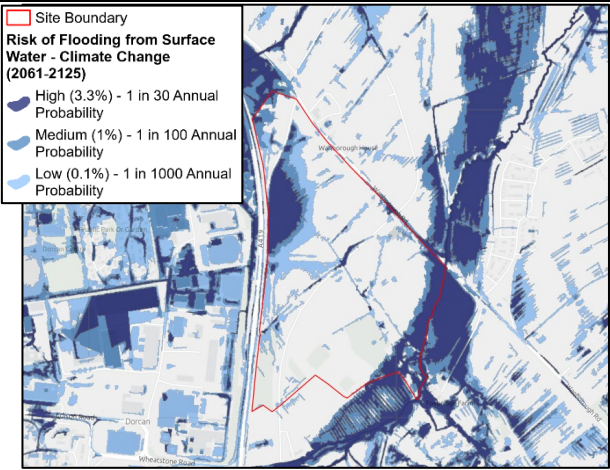
If development is proposed within Flood Zone 3 'High Probability' then further detailed modelling would be required to verify the extent of the 1 in 30 AP Flood Zone 3b Functional Floodplain' (the current extent is based on the national scale RoFRS mapping only).

	It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26%, allowance for climate change flood level, and a suitable freeboard above surrounding ground levels to mitigate the risk of surface water flooding in an extreme rainfall event; 2. Development should be designed to avoid impacts to fluvial floodplain capacity. Where wider planning constraints necessitate intervention, floodplain storage will need to be analysed to show that the proposed development will result in a net betterment in the available capacity during the 1 in 100 AP + climate change flood event; 3. Sustainable Drainage Systems (SuDS) should be a key element of the site surface water management strategy in accordance with LLFA requirements; 4. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a severe surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA; 5. Any basement areas within flood affected areas of the site should be suitably designed, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';

18-042 – Foxbridge Village (SHLAA ref: s0371, Local Plan ref: NEV07)					
Grid Reference	SU1987284366		Post Code (nearest)	SN3 5JF	
Development Proposal	Residential-led mixed use		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site comprises agricultural land. The Liden Brook Main River is located on the site's south-eastern border and flows in a north-east direction. A branch of the Dorcan Stream Main River is located approximately 50m from the western boundary of the site, which flows north-west for approximately 300m before merging with a second channel and flowing north-east.				
Topography			Ground levels fall from south-west to north and range from 100m AOD to 93m AOD.		
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)			The majority of the area of the site is in Flood Zone 1 'Low Probability'. A small area in the northern-most part of the site is in Flood Zone 2 'Medium Probability' of the Dorcan Stream. The south-east area of the site is in Flood Zone 2 and Flood Zone 3 'High Probability' of the Liden Brook.		
Flood Zone 1	94%	Flood Zone 2	2%	Flood Zone 3	4%
Flood Defences	There are flood defences in the area, consisting of natural high ground along the Liden Brook and Dorcan Stream.				

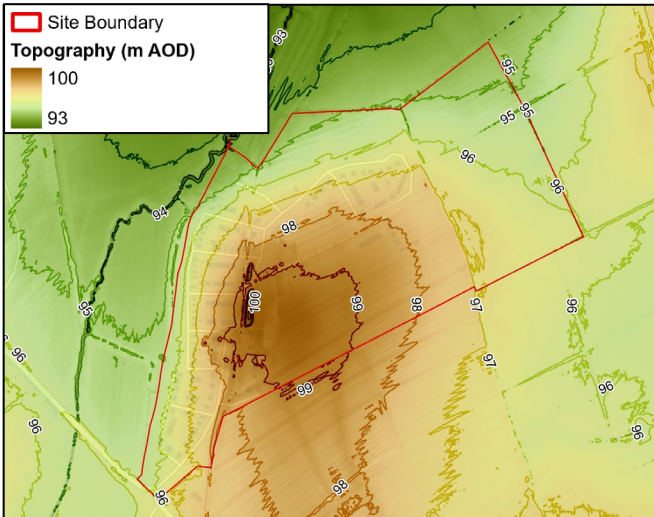
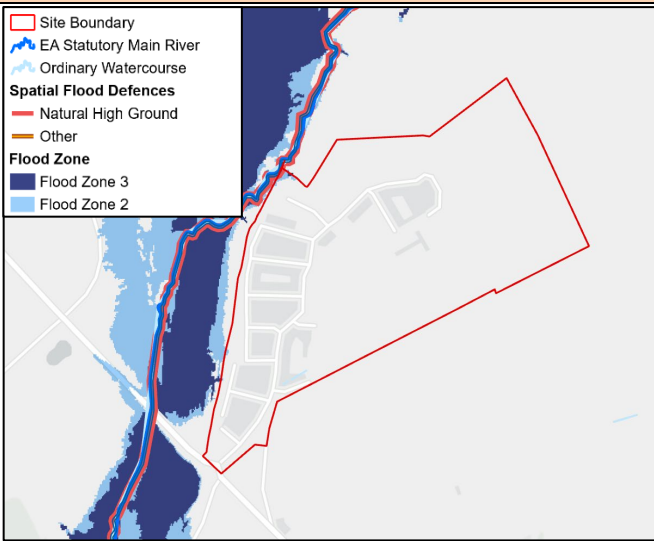
Risk of Flooding from Rivers and Sea (RoFRS)		The main site area is at 'Very low' risk. Small areas in the northern corner are at 'Low' risk. Land on the south-east boundary is at 'Low' to 'High' risk of flooding.
Modelled Flood Extents (Present Day) (Rivers)		The main site area is outside all modelled extents. Small areas in the northern corner are in the 1 in 1000 AP flood extent. Land on the south-east boundary is within the 1 in 100 AP floodplain and the 1 in 1000 AP flood extent. The modelled 1 in 20 AP flood is contained within the channel of the Liden Brook.
Risk of Flooding from Surface Water (Present Day)		The main site area is outside all surface water extents (i.e. 'Very Low' risk) Flood risk is largely concentrated in the southern area, around the Liden Brook, and in a large depression in the north-western part of the site, where risk ranges from 'Low' to 'High'. Smaller areas of isolated ponding are dispersed across the site
Groundwater	The site is outside of any areas susceptible to groundwater flooding – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	

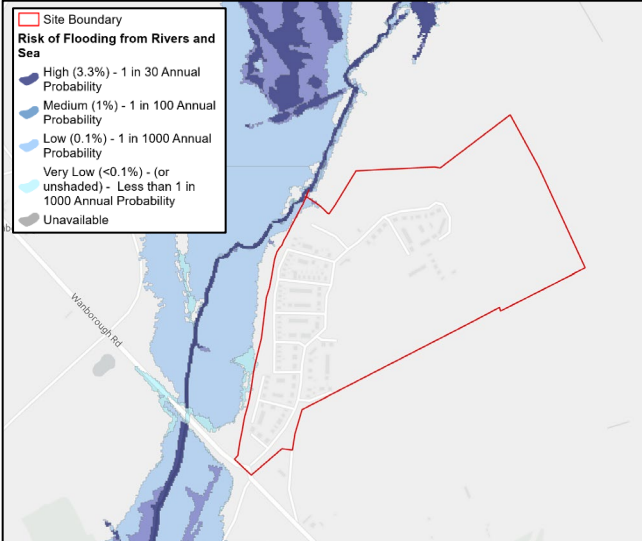
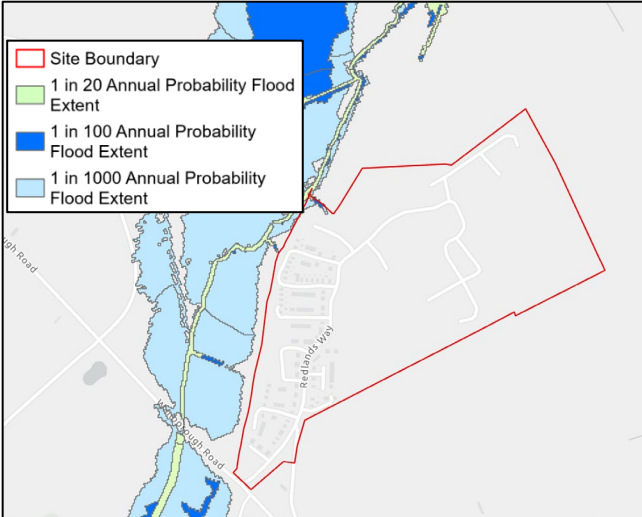
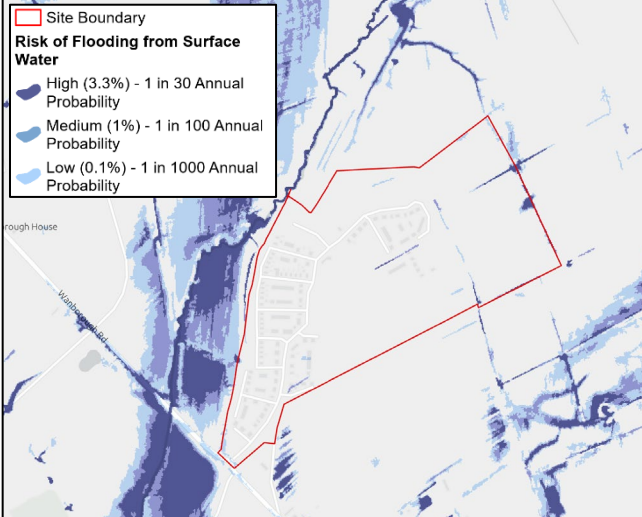
Reservoirs and other sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 ‘Risk of Flooding from Reservoirs – Maximum Flood Extent’.			
Historic Flooding Records	Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 ‘Thames Water DG5 Sewer Flooding Records’.			
Flood Risk – Climate Change				
Climate Change Allowances	The site lies within the ‘Gloucestershire and Vale Management Catchment’.			
	The peak river flow allowances are detailed below:			
	Management Catchment	Climate Change Allowance 2080’s epoch		
		Central	Higher	Upper
	Gloucestershire and Vale Management Catchment	+26%	+41%	+84%
Climate Change Allowances	The peak rainfall allowances are detailed below:			
	Gloucestershire and the Vale Management Catchment	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)		
		Central	Upper End	
		3.3% (1 in 30-year) rainfall	+25%	+35%
1% (1 in 100-year) rainfall	+25%	+40%		
Modelled Flood Extents (Rivers) (Climate Change)			The main site area is outside all modelled extents.	
	The area along the south-eastern boundary is located in the 1 in 100 AP +26% (and +41%) climate change flood extent of the Liden Brook.			

Surface Water (incl Climate Change)		The central area is largely outside all modelled extents (i.e. 'Very Low' risk), but flood risk is exacerbated and denotes local land drainage channels as well as localised depressions and drainage ditches. Surface flood risk in the south-western area is particularly concentrated along the Liden Brook floodplain where the areas are primarily at 'Medium' to 'High' risk.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and the future users/occupants are safe, for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood. Rivers: The main area of the site is outside the 1 in 100 AP plus climate change fluvial flood extent. Flooding from the Liden Brook impacts some of the south-eastern side area, but the Wanborough Road is shown as being outside the reference floodplain. Surface Water: The main site area of the site is largely outside the 1 in 100 AP plus climate change surface water flood extent. However, the surrounding access more significantly impacted with areas at 'High' risk of flooding to be considered further.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA. The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.		

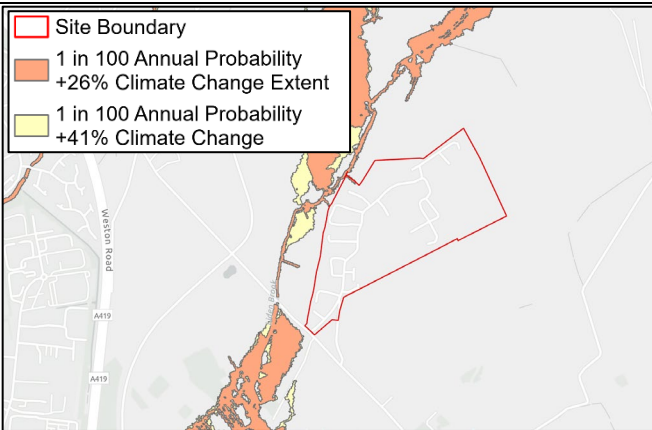
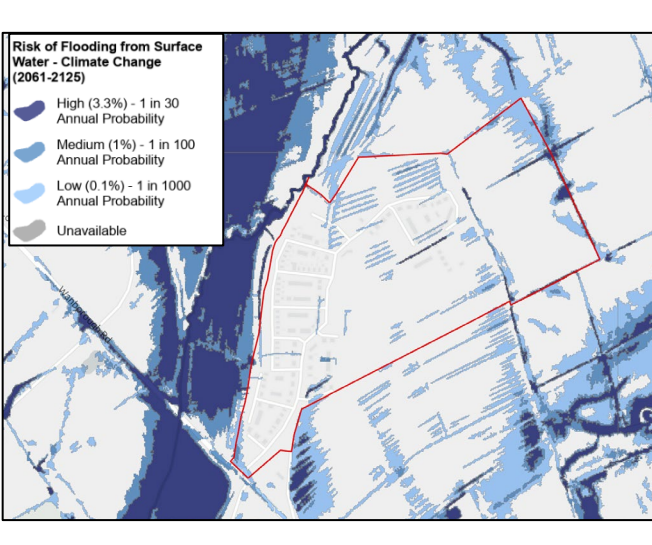
	Summary of Flood Risk A summary of the flood risk to the site is provided below: • The main site area is in Flood Zone 1 'Low Probability'. whereas the southern part of the site adjacent to the Liden Brook is located in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'; • Modelling indicates that Flood Zone 3b 'Functional Floodplain' along the southern border of the site is contained within the Liden Brook channel, based on the 1 in 20 AP flood event.. • The southern area of the site is located in the 'design' 1 in 100 AP +26% climate change extent; • The RoFSW mapping indicates surface water flood risk is concentrated in the southern area of the site. The majority of the rest of the site is not at risk of surface water flooding beyond isolated areas. There is also surface water flood risk on the wider access routes to/from the site, along the access road to the south. • The site is not at risk of flooding in the event of a reservoir breach; • The site is not located in an area susceptible to groundwater flooding. • Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers. • There is no record of the site having been impacted by historic flood events. The central areas of the site is at low risk from all sources of flooding, with flood risk from fluvial and pluvial sources largely concentrated in the southern area of the site. As such it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding. It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.
Implications for New Development	
Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development) Development is appropriate in Flood Zone 1, over the central part of the site. Development in Flood Zone 2 is appropriate, subject to the Sequential Test Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.	
Planning Recommendations	Spatial Planning The central area of the site is in Flood Zone 1 'Low Probability'. A small area in the northern-most part of the site is in Flood Zone 2 'Medium Probability' of the Dorcan Stream. The south-east area of the site is in Flood Zone 2 and Flood Zone 3 'High Probability' of the Liden Brook. If development is proposed within Flood Zone 3 then further detailed modelling would be required to verify the extent of the 1 in 30 AP Flood Zone 3b Functional Floodplain' (since the current extent is based on the 1 in 20 AP scenario only). A review of flood risk within the site has been carried out, and as the risk of flooding is largely concentrated in the southern area of the site it is considered feasible to design the development within the main site area, such that it remains safe throughout the lifetime of the development.

	It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26%, allowance for climate change, and a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; 2. Development should be designed to avoid the floodplain. Where this is not feasible, floodplain storage will need to be analysed to show that the proposed development will not cause a detriment to the available storage during the 1 in 100 AP + climate change flood event; 3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 4. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a severe surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA; 5. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 'Medium Probability' or Flood Zone 3 'High Probability';

18-043- Redlands (SHLAA ref: s0372 and s0442, Local Plan ref: NEV08)					
Grid Reference	SU 20659 84773		Post Code (nearest)	SN3 0BF	
Development Proposal	Residential		Vulnerability Classification	'More Vulnerable'	
Site Description	The existing site patly comprises recently consented new residential development in the western and some central areas of the site at varying stages of construction. The remaining areas of the site, in the south and south-west are occupied by fields. Wanborough Road borders the site in the south-west corner. The Liden Brook (Main River) lies a short distance to the west and borders the north western corner of the site. It flows north east, discharging into the River Cole approximately 2km downstream of the site.				
Topography			Ground levels fall from central and southern areas of the site to the north, east and west of the site and range from 95m AOD to 100m AOD.		
Overview of Flood Risk					
Flood Zone Map (Rivers/Sea)			Almost the entirety of the site is in Flood Zone 1 'Low Probability'. Very minor areas of the site along the western boundary are in Flood Zone 2 'Medium Probability' and Flood Zone 3 'High Probability'.		
Flood Zone 1	99.8%	Flood Zone 2	0.2%	Flood Zone 3	0.0%
Flood Defences	Natural high ground is denoted along either bank of the Liden Brook.				

Risk of Flooding from Rivers and Sea (RoFRS)		Almost the entirety of the site is at 'Very Low' risk. A minor area in the north-west corner is at 'Low' risk of flooding.
Modelled Flood Extents (Present Day) (Rivers)		Almost the entirety of the site is outside all modelled extents. A minor area in the north western corner of the site is located within the 1 in 100 AP flood extent and the 1 in 1000 AP flood extent. The local modelled 1 in 20 AP flood extent lies outside the site boundary, contained within the Liden Brook channel.
Risk of Flooding from Surface Water (Present Day)		The majority of the site is outside all surface water extents (i.e. 'Very Low' risk). The only exceptions are minor localised areas across the site and along the site boundary which appear to denote land drainage channels/ field boundaries and are at a 'Low' to 'High' risk.
Groundwater	Almost the entirety of the site is outside of any areas susceptible to groundwater flooding, although marginal areas along the western site boundary have potential for groundwater flooding at the surface – see Level 1 SFRA – Figure 010 'Susceptibility to Groundwater Flooding'.	

Reservoirs and other sources	The site is not at risk of reservoir flooding during either a dry day or a wet day scenario – see Level 1 SFRA – Figure 011 ‘Risk of Flooding from Reservoirs – Maximum Flood Extent’.			
	Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers – see Level 1 SFRA – Figure 020 ‘Thames Water DG5 Sewer Flooding Records’.			
Historic Flooding Records	The site has not been impacted by historic flood events, based on available EA and SBC records – see Level 1 SFRA – Figure 017 ‘EA Historic Flood Map’.			
Flood Risk – Climate Change				
Climate Change Allowances	The site lies within the ‘Gloucestershire and Vale Management Catchment’.			
	The peak river flow allowances are detailed below:			
	Management Catchment	Climate Change Allowance 2080’s epoch		
		Central	Higher	Upper
	Gloucestershire and Vale Management Catchment	+26%	+41%	+84%
	The peak rainfall allowances are detailed below:			
Gloucestershire and the Vale Management Catchment	Total potential change anticipated (2070s epoch – i.e. 2061 to 2125)			
	Central	Upper End		
3.3% (1 in 30-year) rainfall	+25%	+35%		
1% (1 in 100-year) rainfall	+25%	+40%		

Modelled Flood Extents (Rivers) (Climate Change)		Almost all the site is outside all modelled extents. A small area in the north western corner of the site is located within the 1 in 100 AP +26% (and +41%) climate change flood extent.
Surface Water (incl Climate Change)		The majority of the site is outside all modelled extents (i.e. 'Very Low' risk). There are more significant areas of ponding at 'Low' risk of flooding consisting of clusters of straight lines, due to the topography of the land (assumed to be related to land management). More concentrated area of 'Low' to 'High' risk are evidence in localised areas in the centre and on the eastern boundary, which appear to denote land drainage channels/ field boundaries.
Safe Access and Emergency Planning		
It is necessary for new development to consider and incorporate safe access arrangements, to demonstrate access routes are not compromised by flooding, and that the future users/occupants are safe for the lifetime of the development. This is considered up to the 1 in 100 AP + climate change flood event. Rivers: The site is almost entirely outside the 1 in 100 AP plus climate change fluvial flood extent, as is the adjacent access via Wanborough Road. Surface Water: The majority of the site is outside the 1 in 100 AP plus climate change surface water flood extent. The adjacent access via Wanborough Road is however impacted by surface water flooding and may require further consideration.		
Management of Surface Water		
The Lead Local Flood Authority (LLFA) is the statutory consultee on planning applications for surface water management. Sustainable Drainage Systems (SuDS) should be incorporated into the site design, aiming to achieve greenfield runoff rates, if feasible, in accordance with Section 12.6 of the Level 1 SFRA. It is important that SuDS are designed with due consideration to soil and groundwater conditions. Infiltration techniques should be utilised wherever ground conditions permit, but are unlikely to be unsuitable in areas of shallow groundwater and/or impermeable soils. Further guidance on designing for groundwater is provided in Section 12.6 of the Level 1 SFRA.		

The associated SuDS attenuation features should be located outside the 1 in 100 AP + climate change floodplain, to avoid compromising capacity for the lifetime of the development.

Summary of Flood Risk

A summary of the flood risk to the site is provided below:

- Almost the entirety of the site is in Flood Zone 1 i.e., 'Low Probability', with only minor areas of the site in the north-west corner located in Flood Zone 2 'Medium Probability';
- The north-west corner of the site is located in the 'design' 1 in 100 AP +26% climate change extent;
- The present day RoFSW mapping indicates that the majority of the site is outside all surface water extents (i.e. 'Very Low' risk), except for minor localised areas in the centre of the site and along the site boundary. Flooding is more extensive during the future climate change scenario, where more significant 'Low' risk isolated ponding is shown across the centre and east of the site. There is also notable surface water flood risk on the wider access route to/from the site;
- The site is not at risk of flooding in the event of a reservoir breach;
- Almost the entirety of the site is outside of any areas susceptible to groundwater flooding, with small areas along the western site boundary have potential for groundwater flooding at the surface.
- Thames Water DG5 sewer flooding records indicates that the site lies in an area with greater than 10 properties at risk of flooding from sewers.
- There is no record of the site having been impacted by historic flood events.

The majority of the site is at low risk from all sources of flooding. The majority of the site is at a 'Very Low' risk of fluvial flooding and pluvial flood risk, although during the pluvial future climate change scenario, flooding is more extensive, largely concentrated in the east of the site. As the majority of the site is at a 'Low' risk of flooding, it is considered feasible that the site can be developed safely and in accordance with the requirements of the NPPF, to mitigate the potential risks of these sources of flooding.

It is important that the design process considers the risk of flooding at the earliest conceptual stage, encompassing measures that will ensure the safety of future occupants during a flood event.

Implications for New Development

Flood Risk Vulnerability and Flood Zone 'Incompatibility' ('More Vulnerable' development)

Development is appropriate in Flood Zone 1, over almost the entirety of the site.

Development in Flood Zone 2 is appropriate, subject to the Sequential Test

Development in Flood Zone 3a is appropriate, subject to the Sequential Test and Exception Test

Development in Flood Zone 3b 'Functional Floodplain' is not appropriate.

Planning Recommendations

Spatial Planning

Almost the entirety of the site is in Flood Zone 1 i.e., 'Low Probability', with a small area in the north-west corner of the site within Flood Zone 2 'Medium Probability' of the Liden Brook.

A review of flood risk within the site has been carried out, and as the majority of the site is at a 'Very Low' risk of fluvial and pluvial flooding, it is considered feasible to design the development, such that it remains safe throughout the lifetime of the development. The adjacent access via Wanborough Road is impacted by surface water flooding in the climate change scenario and requires further consideration in terms of safe access.

	It is essential that the following design recommendations are incorporated into the design process from the conceptual stage. A detailed site-based Flood Risk Assessment (FRA) will be required as an integral part of the planning application stage, which should be carried out in accordance with Section 9.3 of the Level 1 SFRA.
	<u>Design Recommendations</u> 1. Finished floor levels within the site should be a minimum of 300mm freeboard above the 1 in 100 AP plus +26%, allowance for climate change, and a suitable freeboard above surrounding ground levels to mitigate the risk in an extreme rainfall event; 2. it is Development should be designed to avoid the floodplain. Given the very small area within the 1 in 100 AP + climate change flood event it is assumed that the proposed development will not cause a detriment to the available storage capacity; 3. Sustainable Drainage Systems (SuDS) should be incorporated into the site surface water management strategy in accordance with LLFA requirements; 4. Safe access to the site is available in the current 1 in 100 AP plus climate change fluvial flood event. In a severe surface water flood event, the wider local road network may be impacted by surface water flooding and should be considered further in the FRA; 5. Any basement areas within flood affected areas of the site are watertight, and the entrance point is situated above the 1 in 100 AP + climate change flood level. Basements should not be used to provide habitable areas in locations classified at Flood Zone 2 i.e., 'Medium Probability' or Flood Zone 3 i.e., 'High Probability';